OU1 and OU2
HEALTH AND SAFETY
AND
EMERGENCY ACTION PLAN

SHIELDALLOY METALLURGICAL CORP. (SMC)
SUPERFUND SITE

CERCLA Docket No. 02-2010-2017

TRC Job No. 112434ES

Prepared by:

TRC Engineers, Inc
1500 Market Street, 12th Floor, East Tower
Philadelphia, PA 19102

May 2011

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1.0 INTRODUCTION

This Health and Safety and Emergency Action Plan (Plan) was developed to protect TRC and subcontractor worker health and safety, and to provide procedures for emergency action at the Shieldalloy Metallurgical Corporation (SMC) Superfund Site, located at 35 South West Blvd in Newfield, New Jersey (Site). A Site location map is included as Figure 1. This Plan also satisfies Paragraph 47 of the United States Environmental Protection Agency's (USEPA's) Administrative Order on Consent (AOC) executed for the Site on April 28, 2010. Specifically, the AOC specifies the following Operable Units (OUs):

- OU1—Non-perchlorate groundwater
- OU2—Non-perchlorate soil, sediment, surface water

The AOC also defines OU3 as Perchlorate-all media. This Plan addresses the work performed for OU1 and OU2 only. The Site also presents some low-level radiation issues relative to a slag pile located in the Restricted Area. This Plan does not include work relative to the slag pile, but does include some worker notification and education relative to radiation, to be comprehensive.

The AOC requires that the following work be performed (by relevant OUs):

- OU1
    - Operation of pump and treat system
    - Groundwater investigation (including targeted work as well as routine ground water monitoring)
    - In-situ pilot program
    - Pump and treat optimization study (and resulting treatment system work)
- OU2
    - Supplemental Remedial investigation (RI)

This Plan addresses the work outlined above.

In addition to the AOC, this Plan must be utilized in conjunction with the detailed descriptions of the activities in the following reference documents:

- For the O&M of the existing pump and treat system relative to OU1, the *"Andco Heavy Metal Removal System Operations and Maintenance Plan" including PI&Ds,*

prepared by Andco, 1990, and New Jersey Pollution Discharge Elimination System (NJPDES) Permit No. NJ 0004103
- *OU1 Supplemental RI Workplan*
- *OU1 Permit-by*-rule (and subsequent amendments/updates) for the in-situ pilot test Work Plan
- *OU2 Supplemental RI Workplan*

The remainder of this section discusses the general training requirements of the project. The remainder of this document is organized as follows:

- Section 2 presents background project information;
- Section 3 discusses key personnel and job functions;
- Section 4 discusses the hazard analysis and mitigation;
- Section 5 discusses emergency response;
- Section 6 presents site security and work zones;
- Section 7 discusses air monitoring;
- Section 8 presents personal protective information;
- Section 9 provides decontamination procedures; and
- Section 10 presents the Plan acknowledgement.

Supporting tables and figures are included.

1.1 Required Training

TRC Site personnel are required to read, review, and strictly comply with this Plan. TRC contractors (and any lower tier subcontractors) must read, review, and strictly integrate this Plan into the contractor's health and safety plan.

All personnel performing work associated with the remedy on the site must have minimally 24-hour OSHA Hazwoper Training and must have current 8-hour Hazwoper annual refresher training. The Emergency Coordinator and alternate(s) must be trained in OSHA 8-hour Hazwoper Site Supervisor Training.

Additionally, site personnel performing work onsite associated with the remedy must have a minimum of 3 work days (24 hours) of field experience under the direct supervision of a trained, experienced supervisor. Employees who can show by documentation of work experience and/or training that they have had the equivalent to the stated requirements shall be considered as meeting these training requirements.

TRC employees and subcontractors performing work onsite associated with the remedial activities will attend initial and follow-up site and task-specific safety briefings. The briefings will discuss the work to be completed, task assignments, the contents of this Plan, site hazards, and hazard mitigation methods. Follow-up briefings will be conducted when site conditions change, revisions are made to this Plan, or when new employees are introduced to the Site.

Notification will also be required for radiation awareness for all Site personnel. No personnel will be allowed in posted radiation controlled areas unless authorized and trained to do so.

Site specific training for forklift operation, fall protection and lock-out tag-out is required for pump and treat system operators.

1.2 Respiratory Fit Testing

This project is not expected to require the need for respirators. If respirators are necessary, personnel required to wear respirators will receive documented fit-testing and training prior to wearing a respirator. Employees will need to be medically fit to wear a respirator per 29 CFR 1910.134.

1.3 Medical Surveillance

Site TRC employees will be medically monitored in accordance with 29 CFR 1910.120. Employees potentially exposed to noise levels above an 8-hour time weighted average of 85 decibels will participate in a hearing conservation program. The program will include annual audiograms to determine any hearing loss, as well as training on loss prevention.

Note, noise monitoring conducted by TRC during pump and treatment O&M activities showed that noise levels were <85dBA in the treatment facility. Other activities will be surveyed as needed to assess the noise hazard.

1.4 Restricted Area

The slag pile is considered a restricted area, and is separately fenced and placarded. Work covered by this Plan does not generally require access to the restricted area. All workers should review and sign a restricted area notice upon their first visit to the Site that will be kept on file at the treatment plant. In the event that access to the restricted area becomes necessary, workers will be accompanied by the Site Radiation Officer from SMC.

2.0 BACKGROUND INFORMATION

2.1 Site Setting

Specialty glass manufacturing began at the Site in 1924. SMC manufactured specialty metals at the Site from 1955 to approximately 2007. The Site is currently used as office space and sublet as warehousing and construction equipment storage space.

The SMC property comprises 67.7 acres and is fenced. A Site map is included as Figure 2. The former manufacturing area exists in the northwest portion of the Site, and is generally covered by buildings and paved areas. The restricted area exists in the eastern portion of the Site (and has its own fencing, inside of the Site perimeter fence). A former storage yard exists between the former manufacturing area and the restricted area. The southern portion of the Site contains former process lagoons and "green" areas, planted with trees and grass as part of a regulatory-required restoration.

A groundwater plume originates at the Site and extends offsite in a southwesterly direction (approximately ½ mile), generally to the Farm Parcel, a secondary 19.8-acre parcel purchased by SMC to install and operate one of the remedial pumping wells. The Farm Parcel is leased to a farmer.

The SMC facility is bordered as follows:

- To the north by a former rail spur and a former landfill;
- To the west by Conrail rail lines, West Boulevard, and various light industries and residences;
- To the east by a wooded area, residences and small businesses; and
- To the south by Hudson Branch stream, its associated wetlands/headwaters, and residences (located along Weymouth Road).

Site surface water runoff generally flows to the south. Some of the runoff flows into an on-site impoundment located in the southwest corner of the Site. The on-site impoundment also receives the effluent from the pump and treatment system, which discharges to an unnamed branch of Hudson Branch stream. The Hudson Branch stream flows southwesterly (past the Car Wash and the Farm Parcel) into Burnt Mill Pond (approximately 6,500 feet from the Site). The Burnt Mill Branch stream is located 4,000 feet west of the Site and flows from the north to the south into Burnt Mill Pond.

2.2 Environmental Site History

Remedial investigations, which started at the Site in 1972, identified chromium as the primary contaminant of concern in groundwater. SMC installed a focused, on site pump-and-treat system in 1979, pumping from well W8 and treating the groundwater via ion exchange. The extraction well was switched from well W8 to well W9 (well W9 is part of the current system) in 1983. Treated water was (and is currently) discharged into an on-site impoundment, then to an unnamed tributary of the Hudson Branch stream.

In 1989, four (4) extraction wells were added to the pump-and-treat system to better capture the downgradient chromium plume, including the following wells: Layne, RW6S and RW6D (the "carwash" wells on Weymouth Road); and RIW2 (at the Farm Parcel). Also in 1989, SMC expanded the treatment system to include an air stripper, to address the trichloroethene (TCE) that also exists in the groundwater. The metals-treatment portion of the system was changed to the current electrochemical precipitation in 1991. This OU1 pump and treat system has basically been operating continually since 1989.

Former wastewater treatment lagoons were the primary source of groundwater contamination. One original unlined lagoon was replaced with nine smaller lined lagoons. SMC closed the nine wastewater treatment lagoons, during several phases from 1995 to 1998. This work included the excavation and offsite disposal of over 1,000 tons of soil, and post-excavation confirmatory soil sampling.

TRC assumed responsibility for the chromium and TCE groundwater contamination in 2006. Currently, over sixty (60) monitoring wells exist throughout and downgradient of the Site. Routine groundwater sampling has occurred since the 1980s.

2.3 Planned Site Activities

The AOC requires that the following work be performed (by OUs):

- OU1
    - Operation/optimization of pump and treat system, including pilot testing of ion exchange treatment technology
    - Groundwater investigation (including targeted work as well as routine ground water monitoring)
    - In-situ pilot program

- OU2
    - Remedial investigation

2.3.1 Electrochemical Pump and Treat

Five groundwater extraction wells, two on-site in the southwest corner of the manufacturing portion of the Facility (i.e., recovery well W9 and Layne) and three offsite (i.e., recovery wells RW6S, RW6D, and RIW2) withdraw ground water at a cumulative rate of up to approximately 400 gallons per minute (gpm). Each extraction well is housed in a local control building and includes equipment and appurtenances such as magnetic flow meters, pressure switches and gauges.

The chemical properties of the water indicate a pH of approximately 6-7 and a maximum influent hexavalent chromium (Cr^{+6}) concentration of approximately 5-10 milligrams per liter (mg/l). The water is pumped into the influent tank (T-301). Other process recycle streams (i.e., filter press filtrate, dirty backwash water, sump discharges, stormwater from site catch basin CB-23, and flows from draining and rinsing other equipment) are also directed to the influent tank.

The process flow is monitored and controlled by a computer. The computer has remote internet access. The key components are as follows:

1. Electrochemical cells
2. Mixing tanks
3. Lamella clarifier
4. Polishing filters
5. Filter press
6. Air stripper

These components are discussed below in order to suitably explain the process for purposes of formulating appropriate health and safety protocols.

Electrochemical Cells

The electrochemical cells serve to reduce hexavalent chromium to trivalent chromium. There are five electrochemical cells (A-E). Each cell consists of a fiberglass body with internal consumable cold rolled steel electrodes. The ground water flows through the gaps in contact with the electrodes. Electrical connections are made between the D.C. cell power supply and the two end electrodes only. The electrical current flows through the ground water from electrode to

electrode resulting in an electrochemical reaction whereby the positively charged side of the steel electrode releases ferrous hydroxide (and is thereby consumed). On the negatively charged side of the electrode, hydrogen gas is formed. The hydrogen is vented to atmosphere through a vent at the top of each cell.

In order to maintain treatment efficiencies, the electrochemical cells are periodically "acid washed", in essence to keep the surface of the electrodes clear. Acid is stored in a tank in the treatment building, then pumped to a dilute acid tank, where the acid is mixed with clean water to desired concentrations.

Mixing Tanks

Following the electrochemical cells, the water flows through a degassing tank then into a mixing tank. In the mixing tank, the pH of the water is raised (to approximately 9 su) and polymers are added. From the mixing tank, the water flows into a paddle mixer, designed to formulate flocculant.

The pH is raised with the addition of caustic. Caustic is stored in a tank in the treatment building, then pumped into the mixing tank.

Lamella Clarifier

From the mixing tanks, the water flows into the Lamella Clarifier, wherein the flocculant (sediment containing the chromium) settles to the bottom, and the cleaner water flows to the polishing filters. The sediments from the bottom are pumped to the filter press.

Polishing Filters

The polishing filters serve to remove remaining solids from the water. There are three similar polishing filters, A, B, and C. Each filter is considered a multi-media filter. The multimedia filter contains multi layers of specifically sized media. A layer of anthracite is on top, with sand and garnet layers below. The media size gets progressively finer moving toward the bottom of the bed. A layer of coarse gravel is placed at the bottom to support the media and evenly distribute the flow. As the stream moves downward through the bed, progressively smaller particles are trapped by progressively finer layers. Periodically, the filters are backwashed, a process whereby clean water is pressurized from the bottom of the filter to the top, effectively removing sediments. This sediment-laden water is pumped into the "dirty tank",

then pumped back into the influent tank at the head of the treatment system. The filters are also air-sparged, a process whereby pressurized air is directed upward into the filter in order to properly organize the media.

Filter Press

Sediment from the Lamella Clarifier is pumped into the filter press, wherein moisture from the sediments is effectively squeezed out between filter plates pressed together with pressurized air. Removed water is pumped back into the system. The dried sediments (i.e. filter cake) is manually scraped from the filter press, placed into a container mounted to a forklift, and placed in a dumpster for offsite removal. The filter is periodically cleaned with a steam cleaner to maintain efficiencies.

Air Stripper and Treated Water Discharge

Water from the polishing filters is pumped into an air stripping tower to remove remaining VOCs. The stripping tower is a vertical tank packed with media. The water falls from the top while air is blown upward, removing the VOCs. The air stripper is the last element of treatment. Treated water travels through an underground pipe approximately 300 feet into the on-site impoundment. The point at which the treated water discharges to the on-site impoundment is referred to as outfall DSN 001B in the Site's discharge permit. The on-site impoundment also receives stormwater discharges from other areas of the Site. Water flows out of the southern end of the on-site impoundment at an outfall known as DSN-004A, through a flow spreader and an "H" flume, where the flow rate is recorded using an ultrasonic flow meter that is housed inside a local metering station. This outfall discharges to an unnamed stream that flows into Hudson Branch.

Routine maintenance of the system, the building, and the ancillary facilities are completed by TRC staff.

2.3.2 Ion Exchange Pilot Test

TRC will be performing a pilot test of the treatment system. The purpose of the pilot test is to work towards improved treatment system operational efficiencies (including the reduction of electric consumption). This pilot test will include certain facility alterations (demolishing existing equipment in the north end of the treatment building, installing a new rollup door, adjusting concrete slabs) and building an ion exchange treatment system. Initially, the extraction

well system will remain in its current state. Future hydraulic optimization studies may alter the pumping scenarios somewhat. The influent tank described in the electrochemical system discussed above will remain generally the same. Also, the air stripper and discharge configuration will remain generally the same. If successful, the ion exchange system would be put online in lieu of the electrochemical system. General construction activities during the pilot test equipment installation will include mechanical work, electrical work, chemical handling, and general construction activities.

The ion exchange pilot test equipment is being designed, and will generally include the following components:

1. Initial filtration
2. pH adjustment
3. Ion Exchange vessels
4. Air stripping

These components are discussed below.

Initial filtration

From the influent tank, water will flow through a bank of filters, designed to remove solids. These filters will be periodically changed, and the spent filters placed in a container for offsite disposal.

pH adjustment

In order to condition the water for the ion exchange, the pH of the water will be lowered somewhat. This pH adjustment will occur in a tank via the addition of acid. Acid will be stored in a tank in the treatment building.

Ion Exchange Vessels

The removal of chromium will generally occur via ion exchange. The water will be passed through a series of vessels containing specifically chosen resins. These resins will serve to "filter" the chromium from the water. When a given vessel is spent, it will be loaded on a truck (via a forklift) and returned to the resin vendor for recycling. An appropriate replacement vessel will be put online once the spent vessel is removed.

2.3.3 OU1 and OU2 Investigations

It is possible that certain investigations be conducted on OU1. It is required that investigation be conducted on OU2. The specific scope of these investigations may vary, but will generally include the following activities:

1. Groundwater well installation
2. Groundwater well sampling
3. Soil boring installation and sampling
4. Sediment and surface water sample collection

2.3.4 OU1 In Situ Program

In order to expedite cleanup of OU1, it is necessary to conduct an in situ program. Generally, the in situ program may include the following activities:

1. Groundwater well installation
2. Trench installation
3. Mechanical and electrical equipment installation
4. Injection of select chemicals into OU1
5. Program monitoring

3.0 KEY PERSONNEL AND JOB FUNCTIONS

Table 3-1 provides the contact telephone numbers of persons or groups that may require notification.

Table 3-1. Project/Emergency Contact Information

CONTACT	PHONE NUMBER
FIRE	911 – Emergency
POLICE	911
AMBULANCE	911
HOSPITAL South Jersey Hospital Regional Medical Center	856-641-8000
Bureau of Emergency Response	1-877-927-6337
National Response Center	800-424-8802 202-267-2675
Emergency Response Contractor– EWMI	1-877-460-1038.
USEPA	800-424-8802

PRIMARY PROJECT/EMERGENCY CONTACTS

CONTACT	PHONE NUMBERS
Project Coordinator—PJ Hansen	215-246-3449
SMC Plant Manager-George Paladino	856-498-7166
EWMI—all spills	484-275-6900
Treatment System—Larry Remsen	856-697-3800
Site Safety Officer—assigned by task	--

3.1 Project Coordinator

The Project Coordinator is responsible for controlling technical work in an environmentally safe manner, assuring that operational hazards are minimized and implementing this Plan during all project task elements. Some specific responsibilities include but are not limited to:

(1) Verifying that all personnel involved with this project have a copy of this HASP, have read and understand the HASP, and have completed the HASP sign-off sheet.

(2) Assuring that all personnel involved with this project have attended a briefing regarding the contents of the HASP and site-specific hazards prior to performing work.

(3) Determining that sufficient Personal Protective Equipment (PPE), air monitoring and equipment as required by this HASP are available.

(4) Assuring that all contractor personnel submit documentation of employee participation in medical, training and drug & alcohol programs.

(5) Maintaining a high level of health and safety consciousness among the field personnel.

3.2 Corporate Health and Safety Officer (HSO)

The Corporate Health and Safety Officer is responsible for the preparation, interpretation, and modification of the HASP. Some specific duties include but are not limited to:

(1) Advising the Project Coordinator and field personnel on matters relating to health and safety.

(2) Recommending appropriate PPE and air monitoring instrumentation to protect personnel from site hazards.

(3) Conducting field audits, if deemed necessary, to monitor the effectiveness of the HASP and to assure compliance with it.

(4) Performing personal exposure monitoring where required and, where deemed necessary, to determine the adequacy of protective measures and PPE specified by this HASP.

(5) Maintaining contact with the Project Coordinator and field personnel to regularly evaluate site conditions and any new information that might require modifications to the HASP.

(6) Working with the Project Coordinator to ensure that sufficient PPE is available onsite.

(7) Conducting briefing meetings, when necessary, to apprise personnel of the contents of the HASP and site hazards.

(8) Conducting accident/incident investigations and preparing accident/incident investigation reports along with the appropriate operations personnel.

3.3 TRC Site Safety Officer (SSO)

The Site Safety Officer is responsible for ensuring the Health & Safety guidelines are followed, in addition to monitoring for airborne contaminants when necessary and evaluating new hazards and operation changes. The Site Safety Officer has the authority to correct all noncompliance situations immediately and to stop work in cases of immediate danger. Specific responsibilities include but are not limited to:

(1) Obtaining the air monitoring instrumentation required and conducting the necessary air monitoring.

(2) Verifying that all PPE and other health and safety equipment is in proper working

condition.

(3) Upgrading and downgrading PPE as specified in the HASP. Only the SSO, with the consent of the Corporate Health & Safety Officer can downgrade to a lower level. Changes will be made via a memo, filed with this HASP.

(4) Notifying the Project Coordinator and Corporate Health & Safety Officer of all noncompliance and dangerous situations.

(5) Supervising and monitoring the safety performance of all field personnel to ensure required safety and health procedures are followed and correct any deficiencies.

(6) Reporting all accidents/incidents to the Corporate Health & Safety Officer.

(7) Initiating emergency response procedures.

3.4 TRC Field Team Manager

The Field Supervisor is responsible for the field operations needed to complete the project. Some specific responsibilities include but are not limited to:

(1) Reading and understanding the HASP and completing the HASP sign-off sheet.

(2) Ensuring all equipment needed for the project is available and properly maintained.

(3) Communicating newly identified hazards or noncompliance issues with the Project Coordinator, Corporate Health & Safety Officer and the Site Safety Officer.

(4) Ensuring field personnel have received the necessary training and Health & Safety briefings before work begins. Conducting a Tailgate Safety Briefing each day before fieldwork is started and review emergency procedures. A copy of the Daily Sign In and Tailgate Meeting Attendance Form.

(5) Correcting any deficiencies regarding health, safety or operating procedures.

(6) Reporting any injuries and illnesses to the Project Coordinator and the Corporate Health & Safety Officer.

(7) Stopping work in cases of immediate danger.

In some cases the TRC Field Manager and Site Safety Officer may be the same person.

3.5 Field Personnel (FP)

All field personnel are responsible for following the Health & Safety procedures specified in this HASP and work practices specified in applicable operating procedures. Some specific responsibilities include but are not limited to:

(1) Reading and understanding the HASP and completing the HASP sign-off sheet.

(2) Reporting all accidents, incidents, injuries, illnesses or near misses to the Field Supervisor.

(3) Complying with the requests of the Site Safety Officer.

(4) Immediately communicating newly identified hazards or noncompliance issues to the Field Team Leader and/or Site Safety Officer.

(5) Stopping work in cases of immediate danger.

4.0 HAZARD ANALYSIS & MITIGATION

4.1 Hazard Identification

The planned site activities described in Section 2.3 each have a number of associated tasks. A hazard analysis of these tasks is as follows:

Task	Chemical Handling	Mechanical Equipment	Electrical Equipment	Construction Activities	Groundwater Well Installation	Sample Collection
Electrochemical Treatment System Operation	X	X	X			X
Ion Exchange Treatment System Construction/Operation	X	X	X	X	X	X
In Situ Program Implementation	X	X	X	X	X	X
OU1 and OU2 Site Investigation	X	X	X	X	X	X

These tasks present the following identified hazards:

Task	Chemical Handling	Mechanical Equipment	Electrical Equipment	Construction Activities	Groundwater Well Installation	Sample Collection
Chemical Exposure	X	X		X	X	X
Physical Hazards	X	X	X	X	X	X

The following subsections will summarize potential hazards identified for the Site and steps workers must follow to reduce the potential impact to human health and the environment from these hazards.

The integration of medical evaluations, worker training relative to physical and chemical hazards, safe work practices, proper personal protection, environmental monitoring, work zones and site control, appropriate decontamination procedures and contingency planning into the project will minimize the chance of unnecessary exposure to physical and chemical hazards.

4.2 Chemical Exposure

This outlines the steps to prevent chemical exposure at the Site. A summary of chemicals and contaminants present at the Site are provided as follows:

- Material safety data sheets (MSDSs) for chemicals used and proposed at the Site are provided in Appendix A.

4.2.1 Exposure to Contaminated Groundwater

Personnel may be exposed to the contaminants in groundwater. These contaminants are present at various concentrations.

Exposure to known contaminants must be kept to a minimum. Vapor exposure to TCE based on the Henry's Law constant indicate that exposure above the PEL is not likely but exposure above the TLV is possible.

Primary contaminants of concern in groundwater, with the potential for chemical exposure at the Site, include:

Table 4-1. Primary Contaminants of Concern in Groundwater

Compound	Maximum Concentration	TLV	PEL
Hexavalent chromium	30 mg/l	0.05 mg/m3	0.1C
TCE	2 mg/l	50 ppm	100 ppm

Potential worker exposure to these chemicals would occur through ingestion and absorption from direct contact with the contaminated groundwater and through volatilization from exposed groundwater to the air. To prevent exposure during activities, workers must adhere to the PPE requirements detailed in Section 8.0 and the Decontamination procedures detailed in Section 9.0. Chromium in water is not expected to be an inhalation concern because it remains in solution until treated.

Sample bottles could also contain small amounts of preservatives that are corrosive. These should be handled with gloves and direct contact minimized.

4.2.2 Exposure to Treatment System Chemicals

The primary treatment system chemicals are discussed in the subsections below.

Caustic Soda-Sodium Hydroxide, (NaOH)

Caustic soda in dry form is used to raise the pH. It must be stored dry and protected from contact with metals, acids and oxidizers. The caustic solution can cause delayed skin burns and fumes if mixed with water. PPE including gloves, aprons and safety glasses must be worn when handling caustic soda.

Acid-Sulfuric Acid

Sulfuric acid is used in solution in water. It is used to lower pH and in preparing the cell washing solutions. It is considered a poison and the inhalation of the vapors can cause irritation to the respiratory system and mucous membranes. It can also cause skin burns and irritate the eyes.

Treatment Polymers

The treatment polymers include Nalclear 7763 and Ultrion 7157, produced by Nalco. These polymers are added during wastewater mixing to facilitate good solids settlement. These polymers create slippery surfaces when mixed with water. These polymers should not be ingested.

Laboratory Chemicals

Certain laboratory chemicals are used to help monitor the treatment system. Generally, these chemicals include buffers to calibrate pH measurement devices and reagents used for the lab HACH meter (for measuring chromium concentrations and solids in the waste water). The chemicals are produced by the HACH Company, including #4 pH buffer, #7 pH buffer, #10 pH buffer, Cr reagent #2, Cr reagent #3, and the acid reagent.

4.2.3 Exposure to In Situ Pilot Test Chemicals

Sodium Bicarbonate

Sodium bicarbonate (baking soda) is a mild alkali and will react with acids. For this project, it comes in the form of a powder, which is mixed with water. It has a slight health risk and slight reactivity. It is a food additive and used in antacid drugs. It is an irritant to the eyes and respiratory system. Appropriate protections for dust control and inhalation should be used.

Calcium polysulfide

This product has a moderate health risk and is a corrosive. It can cause skin and eye damage and can be fatal if swallowed. The pH is between 11.5 and 11.8. Once ingested, it can

decompose to release hydrogen sulfide. Calcium polysulfide does have a strong sulfur odor. Because of the caustic nature of this compound, appropriate PPE should be worn.

There is the possibility that an acid and/or buffer may be used as well. Should this become necessary, the appropriate material and its safety procedures will be specified.

Chromatint Rhodamine

This liquid has a moderate health risk and causes skin and eye irritation. The liquid has a pH of 10.5 and there is no odor.

Zero Valent Iron

This material comes in the form of a powder for this project. The powder is mixed with water. Appropriate protections for dust control and inhalation should be used.

Emulsified Vegetable Oil

This material is a natural oil derived from vegetables, not dissimilar to vegetable oil used for cooking. No significant issues are associated with its use.

4.2.4 Radiation

As discussed in Section 2, a restricted portion of the Site contains slag that has some radiation properties. Access to this area is restricted. The scope covered by the HASP does not require accesss to this restricted area, so no radiation exposure is expected.

Each employee entering the Site should receive the "radiation awareness" information, as discussed previously.

4.3 Physical Hazards

Physical agents that site workers can reasonably be expected to encounter, and mitigation measures to reduce effects of these agents, are discussed below.

Other hazards such as vehicle traffic, weather conditions, insects, poison ivy, and Lyme Disease will be evaluated daily on an as-needed basis by the SSC. The floors in the treatment building can be wet and slippery and there are many trip hazards to look out for. Ladders are used to access upper areas and they must be used safely.

Activities will primarily consist of system and building maintenance and groundwater sampling and injection during these activities, the potential for physical injury and chemical exposure exists. Work may be performed during all four seasons, and, as a result, the potential exists for heat and/or cold stress to impact workers especially those wearing protective equipment and clothing.

4.3.1 Heat Stress

There is a potential for heat stress from the use of protective clothing and climate conditions. One or more of the following procedures may be employed to alleviate potential heat stress problems in the event that site conditions warrant the use of PPE, or ambient temperatures exceed 85° F. Heat stress training must be emphasized during the daily safety meetings, and adequate supplies of potable water must be provided to workers each day.

General Precautions

Provide plenty of liquids. To replace body fluids (water and electrolytes) lost because of sweating, use a 0.1 percent saltwater solution, more heavily salted foods, or commercial drink mixes. The commercial mixes may be preferable for those employees on a low sodium diet.

In extremely hot weather, attempt to:

- Reschedule the work.
- Conduct operations in early morning or evening and rotate shifts of workers wearing impervious clothing.
- Install mobile showers and/or hose-down facilities to reduce body temperature and cool protective clothing.
- Acclimatization for workers not accustomed to working in elevated temperature environments.

Ensure that adequate shelter is available for breaks to protect personnel against heat, etc., which can decrease physical efficiency and increase the probability of accidents.

Heat Stress Monitoring

For monitoring the body's recuperative ability toward excess heat, one or more of the following techniques should be used as a screening mechanism. Monitoring of personnel wearing impervious clothing should commence when the ambient temperature is 70° F or above. Frequency of monitoring should increase as the ambient temperature increases or as slow

recovery rates are indicated. When temperatures exceed 80° F, regardless of the use of PPE, workers will be monitored for heat stress after every work period.

Good hygienic standards must be maintained by the employee to aid in the prevention of heat stress illnesses. Frequent change of clothing and daily showering at a minimum should occur with clothing being allowed to dry during rest periods. Persons who notice skin problems should immediately inform their supervisor.

1. Heart rate (HR) should be measured by the radial pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats/minute. If the HR is higher, the next work period should be shortened by 25 percent. The HR is then measured again, once each minute for 2 minutes, (a total of three measurements) after the initial rest period measurement. The HR should decrease by ten beats per minute between each measurement (a total reduction of 20 beats). If the HR does not decrease, the work period should be reduced by 25 percent.

2. Body temperature can be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature (OT) at the beginning of the rest period should not exceed 99° F. If it is greater than 99° F, the next work period should be shortened by 25 percent. OT should be measured again at the end of the rest period to make sure that it has dropped below 99° F.

Effects of Heat Strees

If the body's physiological processes fail to maintain a normal body temperature because of excessive heat loading, a number of physical reactions can occur. The severity of these reactions ranges from mild (such as fatigue, irritability, anxiety, and decreased concentration, dexterity, or movement) to severe (fatal).

Heat-related illnesses include:

- **Heat rash** (also known as prickly heat rash) is caused by continuous exposure to heat and humid air and aggravated by chafing clothes. Heat rash decreases the ability to tolerate heat as well as being a nuisance. Signs are a red prickly-like rash.

  FIRST AID: Employees exhibiting signs of heat rash will be directed to shower and change to clean, dry clothing.

- **Heat cramps** are caused by profuse perspiration with inadequate fluid intake and electrolyte replacement (especially salts). Signs are muscle spasms and pain in the extremities and abdomen and may occur several hours after work has stopped.

FIRST AID: Employees showing signs of heat cramps will be directed to lie in a cool, shady area, and drink cool fluids. If symptoms persist or worsen, the employee will be transported to an emergency facility.

- **Heat exhaustion** is caused by increased stress on various organs to meet increased demands to cool the body. Signs are shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.

  FIRST AID: Employees with signs of heat exhaustion will be brought to cool, shady location and given fluids. After recovering, the employee will be dismissed for the day. If victim is unconscious, or conditions persist, the victim will be transported to a hospital.

- **Heat stroke** is the most severe form of heat stress. The body must be cooled immediately to prevent severe injury and/or death. Signs and symptoms are red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; and/or coma.

  FIRST AID: HEAT STROKE IS A MEDICAL EMERGENCY. The victim will be brought to a cool area, aggressively treated by removing constricting clothes and applying wet towels or ice packs, and transported without delay to an emergency facility.

4.3.2 Cold Stress

Ambient air temperatures during site activities may create cold stress for on-site workers. Procedures for recognizing and avoiding cold stress must be followed. Cold stress can range from frostbite to hypothermia. The signs and symptoms of cold stress are listed below.

- **Frostbite** is defined as the actual freezing of one or more layers of skin. In severe cases, organs and structures below the skin can become frozen. Usually, body areas exposed to the most cold, and least body warmth, are affected first. These areas include fingers, toes, ears, and the tip of your nose. Frostbite is characterized by pain and loss of dexterity in the affected limb. The tissue initially appears reddened, but my progress to white, blue, or black.

  FIRST AID: Bring the affected employee indoors and call the local emergency clinic. Rewarming of frost-bitten parts are best left to a medical doctor in a controlled setting.

- **Hypothermia** is the condition that occurs when the body's natural warming mechanisms (muscle activity and shivering) cannot counteract the loss of body heat to the environment. The onset of hypothermia is greatly hastened by being wet. Hypothermia is marked by severe, uncontrollable shivering. The patient will show signs of excessive fatigue, drowsiness, irritability, or euphoria. As hypothermia progresses, the patient will begin to lose consciousness, blood pressure will drop, shivering will cease, and the patient may slip into a coma and possibly die.

FIRST AID: If these symptoms occur, remove the patient to a warm, dry place. If clothing is wet, remove and replace with dry clothing. Keep the patient warm, but not overheated. The patient should be gradually rewarmed to prevent shock. If the patient is conscious and alert, warm liquids should be provided. Coffee and other caffeinated liquids should be avoided because of diuretic and circulatory effects. Notify the emergency clinic; if conditions worsen, the patient loses consciousness, or the patient has an altered mental status have the patient transported to an emergency facility.

General Precautions

The reduction of adverse health effects from cold exposure can be achieved by adopting the following work practices.

- Provide adequate insulating clothing to maintain core temperature at 98.6° F if work is to be performed in air temperatures below 40° F. Wind chill cooling rates and the cooling power of air are critical factors. The higher the wind speed and the lower the air temperature in the work area, the greater the insulation value of the protective clothing should be.

- If the air temperature is 32° F or less, hands should be protected by by insulated liners for work gloves.

- If only light work is involved and if the clothing on the worker may become wet on the job site, the outer layer of clothing should be impermeable to water. With more severe work under such conditions, the outer layer should be water repellent, and the outer layer should be changed as it becomes wetted. The outer garments should include provisions for easy ventilation in order to prevent wetting of the inner layer by sweat.

- If available clothing does not give adequate protection to prevent cold injury, work should be modified or suspended until adequate clothing is available, or until weather conditions improve.

- For prolonged work, heated shelters should be available. Workers should be encouraged to use these at regular intervals, with the frequency depending on the severity of the environmental exposure. When entering the shelter, the outer layer of clothing should be removed and the remainder of the clothing loosened to permit heat evaporation, or a change of work clothing should be provided.

- Warm, sweet drinks, such as hot cocoa or soup, should be available at the work site to provide caloric intake and fluid volume. The intake of coffee should be limited because of diuretic and circulatory effects.

- The weight and bulk of cold-weather gear should be included in estimating the required work performance and weights to be lifted in the field.

Workers should be instructed in safety and health procedures regarding cold work environments as part of the pre-work safety meeting. The training program should include instruction in preventing, recognizing, and treating cold stress conditions.

4.3.3 Noise

The effects of noise include psychological effects (interference with communication by speech, job performance, and safety) and physiological effects, such as temporary and permanent hearing loss.

The factors that affect the degree and extent of hearing loss are intensity or loudness of the noise, type of noise, period of exposure of each day, total work duration, and distance from the noise source.

There is a potential for exposure to loud noise associated with heavy equipment, such as drill rigs. To safeguard workers, all personnel will be provided with disposable earplugs when working around heavy equipment. Table 4-2 summarizes the allowable exposure as a function of sound pressure level, as measured in decibels on the "A" weighting scale.

Table 4-2. Permissible Noise Exposure

Sound Level (dBA)	Hours – Minutes	Hours	Sound Level (dBA)	Hours – Minutes	Hours
90	8 - 0	8.00	103	1 – 19	1.32
91	6 - 58	6.96	104	1 – 9	1.15
92	6 - 4	6.06	105	1 – 0	1.00
93	5 - 17	5.28	106	0 – 52	0.86
94	4 - 36	4.60	107	0 – 46	0.76
95	4 - 0	4.00	108	0 – 40	0.66
96	3 - 29	3.48	109	0 – 34	0.56
97	3 - 2	3.03	110	0 – 30	0.50
98	2 - 38	2.63	111	0 – 26	0.43
99	2 - 18	2.30	112	0 – 23	0.38
100	2 – 0	2.00	113	0 – 20	0.33
101	1 - 44	1.73	114	0 – 17	0.28
102	1 - 31	1.52	115	0 – 15	0.25

As a rule of thumb, you are probably exposed to more than 85 decibels if you have to raise your voice to converse with someone three feet or more from you.

4.3.4 Blood-Borne Pathogens

Blood-borne pathogens refer to pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus, human immunodeficiency virus, clostridium tetani (tetanus), and clostridium perfringens (gas gangrene).

The only site personnel who might be exposed to this hazard under normal conditions is the Site Safety Officer, in the event he or she is required to render first aid to an injured worker while waiting for emergency personnel. The Safety Officer will be equipped with a first aid kit that contains gloves, surgical mask, and safety goggles to be used whenever contact with bodily fluids is possible. The kit will also be equipped with a CPR mask that has a one-way valve in the event mouth-to-mouth resuscitation of a worker is required. Antibiotic cleansers will be included in the kit, as will special bags for the containment of medical waste.

Any TRC employee who is exposed to bodily fluids during the course of employment will be counseled in bloodborne pathogens by the TRC's Regional Health and Safety Coordinator, and will be offered a hepatitis vaccine.

4.3.5 Electrical Hazards

Potential for electrical injury to workers is possible at the Site. Caution should be exercised in using small portable electrical equipment, field monitoring equipment, and working/maintaining systems within the treatment building. The TRC Site Manager must pre-approve any maintenance of electrical equipment to be completed by personnel.

Electrical devices and equipment must be de-energized prior to performing maintenance, service, or repairs on them. All extension cords must be kept out of water, protected from crushing, and inspected regularly to ensure structural integrity. Temporary electrical circuits must be protected with ground fault circuit interrupters. Only qualified electricians are authorized to work on electrical circuits. **ASSUME ALL ELECTRICAL LINES ARE ENERGIZED** unless proven/documented to be de-energized. Lockout/tagout procedures must be employed at this Site.

Also be alert to buried and overhead electric lines when conducting site activities. Local "Dig Safe" and/or specific utility companies (e.g., electric, telephone, water, sewer, cable, gas, etc) must be contacted and notified prior to any drilling/excavation activities. Workers should

also be alert to locations of overhead utility lines and care should be exercised at all times not to disturb or come in contact with them.

An electrical safety training module, *Electrical Safety*, is required reading of all users of this plan.

Overhead Electrical Lines

For overhead electrical lines, the minimum clearance to be maintained between the drill rig, hand auger sections, or any other equipment, and the electrical lines is shown in Table 4-3 below. When using portable powered equipment, care must be used to make sure the power cord cannot be stepped on, cut, or tripped over. All powered equipment should utilize ground flow interrupt (GFI) circuits.

Table 4-3. Electrical Clearance

Nominal Voltage of Line	Minimum Clearance (feet)
Up to 50,000	10
Over 50,000 - 75,000	11
Over 75,000 – 125,000	13
Over 125,000 – 175,000	15
Over 175,000 – 250,000	17
Over 250,000 – 370,000	21
Over 370,000 – 550,000	27
Over 550,000 – 1,000,000	42

Stored Energy

Energy is dangerous and can be present in many forms at the site.

- Electricity
- Compressed air
- Hydraulic pressure
- Charged capacitors
- Gas
- Steam

All stored energy must be dissipated prior to removing/working on any piece of equipment. Energy is not only electrical energy, but also positional, rotational, kinetic, hydraulic, or pneumatic energy. Remember to:

- Disconnect the equipment from the power source and lock out the power source to prevent activation.
- Block equipment so that moving parts are firmly fixed in place.
- If possible, lower all raised portions to ground level, or block it so it cannot fall.
- Block or disconnect all hydraulic or pneumatic pistons or cylinders.

Lockout/Tagout

Lockout/tagout is a necessary step for ensuring worker safety prior to performing maintenance or service at the Site.

Lockout is a device which provides a positive means for rendering a switch, valve, raise load, coiled spring, or any energy source inoperative. The lockout device may be a padlock, blanking plate, restraining bar, chain and padlock, or any device which prevents the system from being energized or releasing stored energy.

Tagout is a lockout tag detailing who locked out the system, and the time and date of tagout. Tags must be durable and securely fastened to the lockout mechanism so they do not accidentally fall off. The personnel who placed the locks/tags should only remove locks/tags.

If more than one field person and/or TRC contractor is onsite, only the field team leader or the contractor foreman will be responsible for application and removal of all locks/tags. If both TRC and the contractor are onsite, TRC will delegate lockout/tagout duties to the Contractor foreman.

Remember lockout/tagout does not prevent the release of stored energy; personnel must release or block the release of stored energy also.

Refer to the *Operations and Maintenance Plan* for specific maintenance, service, and de-energizing procedures.

Before removing locks/tags and returning the system to operation mode, be sure that:

- All safety guards are back in-place.
- All work is complete and tools are secured.
- All field team members are positioned for safe start-up.
- Controls are positioned correctly for safe start-up.

4.3.6 Confined Spaces

Confined spaces are any location where access or egress is restricted, such as pits, vaults, tanks, vessels, etc. Confined spaces are present at the project site. TRC personnel will not enter permit required confined spaces. TRC personnel will not enter vessels or any tanks. Confined entry, if required, will be performed by a qualified contractor.

4.3.7 Fire or Explosion

Smoking by workers presents a potential for causing explosion or fire; therefore, no smoking by personnel performing work associated with the remedy is permitted at the Site.

4.3.8 Lifting Hazards

Field operations often require that physical labor tasks be performed. All employees should utilize proper bending and lifting procedures. Whenever an object is to be lifted, the employee should bend at the knees and lift the object using the legs. Additionally, an employee should not attempt to lift bulky or heavy objects (over 30 pounds) without assistance.

4.3.9 Hand Tools/ Power Tools

Certain tasks anticipated at this Site will include the use of powered tools and equipment. The following safety procedures will be adhered to when using this type of equipment.

Hand Tools

- All power cords must be in good condition with no cracking or fraying.
- Power cords must be rated for the appropriate current.
- Ensure all safety guards are in place.
- Ground fault interrupt circuits should be used with portable equipment.
- Hearing protection must be worn when using powered equipment.
- All tools should be carefully passed by hand, not tossed or thrown.
- Do not use damaged tools.
- Keep all tools cleaned and stored in an orderly manner when not in use.
- When coring, breaking, or chipping asphalt or concrete, wear safety glasses and require all others around you to wear safety glasses.
- When using a hand auger, wear work gloves and boots.

4.3.10 Heavy Equipment

Prior to operating heavy equipment, including drill rigs, adequate site cleaning will be performed, if necessary. Care will be taken to provide a safe working area. Work will commence only when tree limbs, unstable ground, or site obstructions do not cause adverse operating conditions.

Before using any heavy equipment, walk completely around the equipment to check for hazards. Make sure the equipment is on solid, level ground. Pay particular attention to overhead

hazards and consult Table 4-3 to determine the minimum distance from overhead power lines to the closest point on the rig.

Do not drive the equipment from one location to another with the mast/bucket/etc in a raised position. Before using heavy equipment, personnel (with the exception of the operator) should be cleared from the areas to the rear and sides of the work zone. Personnel are not allowed to re-enter the workzone without contacting the equipment operator and agreeing to an access route. The operator should announce the equipment is going into operation. No secondary personnel will be allowed on equipment while it is operating. An exclusion zone will be established around the work zone to prevent unauthorized personnel from approaching/entering.

Other safety work procedures:

- All excavation locations should be examined by the utility locator prior to digging or drilling.
- Equipment should only be operated by qualified personnel.
- No person except operator should be within ten feet of operating equipment. In the event of drilling activities with heavy equipment in a fixed location, personnel will limit all activities within 10-feet to those necessary (e.g. air monitoring of breathing zone).
- No passengers are allowed on heavy equipment unless a seat and seatbelt is available for their use.
- Top speed limit on the job site will be 10 miles per hour.

All operators of heavy equipment including forklifts will have undergone training for the equipment in-use and maintain appropriate licenses for the use of the heavy equipment. The operation of all vehicles shall be performed in accordance with State of New Jersey and Federal Department of Transportation requirements. Vehicles entering the Facility will be visually inspected by the field personnel overseeing the intended operation. Any visible safety defect shall prevent the vehicle from entering the Facility until it is repaired.

Field personnel will confirm with the operator that the daily safety inspection was completed and ask about the results. Any safety defects reported during the daily inspection will result in a no-operation condition for that piece of heavy equipment, until repaired.

Drivers transporting hazardous materials must have a current Commercial Drivers License and completed (up-to-date) log books. The vehicles must be properly placarded. It is the responsibility of all drivers to comply with all transportation regulations including obeying posted speed limits, covering loads and utilizing designated transportation routes.

The potential exists for an oil and/or hazardous materials (OHM) release from a vehicle during routine operation at the Site. Where possible, unloading procedures shall be completed in areas of secondary containment (see Tank Unloading Protocol, Appendix B). Where not possible, extra-ordinary care should be taken to prevent a release of OHM to the environment. Any release of OHM due a vehicle accident shall require Emergency Coordinator notification and immediate spill response.

4.3.11 Ladders, Staging, Man-Lifts

Man-lifts are required for maintenance of all ceiling mounted utilities.

All rungs, steps, and platforms shall be corrugated, knurled, dimpled, coated with skid-resistant material, or otherwise treated to minimize the possibility of slipping. The minimum width between side rails of a ladder section shall be 12 inches. Extension sections shall be equipped with positive stops. Ladders, staging, and man-lifts shall be maintained in useable condition, in accordance with manufacture instructions and inspected for damage and wear prior to each use.

Portable Ladders

The length of single ladders or individual sections of ladders shall not exceed 30 feet. Two-section ladders shall not exceed 48 feet in length and over two-section ladders shall not exceed 60 feet in length. Each section of a multi-section ladder shall overlap the adjacent section by at least 3 feet, for ladders up to 36 feet in length; at least 4 feet for ladders up to 48 feet in length; and, 5 feet for ladders up to 60 feet in length. Ladders shall not be tied or fastened together, used as a brace or skid, guy or gin pole, gangway, or for any other uses than that were intended by the manufacturer.

Ladder Placement:

- Ladder base sections must be placed with a secure footing, or lashed, or held in position.
- The top of the ladder must be placed with the two rails supported, unless equipped with a single support attachment.
- The distance from the vertical (e.g., wall) of a ladder should equal one-forth the working length of the ladder.

- Ladders used to gain access to a roof or other area shall extend at least 3 feet above the point of support.

Step ladders shall not exceed 20 feet. Step ladders shall have a spreader or locking device of sufficient size and strength to securely hold the front and back sections of a step ladder in the open position.

Trestle ladders or extension sections or base sections of extension trestle ladders shall not be more than 20 feet in length.

Metal ladders shall never be used near electrical equipment.

No portable wooden ladders will be utilized at the Site.

Scaffolding

There are a number of different types of scaffolds available. This section details some of the general requirements which apply to all scaffolds, as follows.

- The footing or anchorage for scaffolds shall be sound, rigid and capable of carrying the maximum intended load without settling or displacement. Unstable objects, such as barrels, boxes, loose brick, or concrete blocks shall not be used to support scaffolds or planks.

- Scaffolds and their components shall be capable of supporting at least four times the maximum intended load.

- Scaffolds shall be maintained in a safe condition and shall not be altered or moved horizontally while they are in use or occupied.

- Damaged or weakened scaffolds shall be immediately repaired and shall not be used until repairs have been completed.

- A safe means must be provided to gain access to the working platform level through the use of a ladder, ramp, etc.

- Overhead protection must be provided for personnel on a scaffold exposed to overhead hazards.

- Guardrails, midrails, and toeboards must be installed on all open sides and ends of platforms more than 10 feet above the ground or floor. Wire mesh must be installed between the toeboard and the guardrail along the entire opening, where persons are required to work or pass under the scaffolds.

- Employees shall not work on scaffolds during storms or high winds or when covered with ice or snow.

- As noted earlier, there are a number of scaffold types, and 29 CFR1910.28 should be reviewed carefully for special requirements that apply to each type.

Mobile Work Platforms and Scaffolds (Towers)

This section details general requirements for the use of mobile work platforms "man lifts" (including ladder stands but not including aerial ladders) and rolling (mobile) scaffolds (towers). There are a number of mobile work platforms and scaffolds, the general requirements are as follows.

General requirements include:

- All exposed surfaces of mobile ladder stands and scaffolds shall be free from sharp edges, burrs, or other safety hazards.
- The maximum work height shall not exceed four times the minimum base dimension unless outriggers, guys or braces are added to provide stability.
- This standard requires guardrails and toeboards for work levels 10 feet or more above the ground or floor.

OSHA standard 29 CFR 1910.29 should be reviewed carefully for specific requirements.

Other Working Surfaces

Portable dockboards (bridge plates; ramps) shall be secured in position, either by being anchored or equipped with devices, which will prevent their slipping. Movement of the dockboard during material handling operations has resulted in forklifts overturning, or falling off the dock, often with serious injury or death to the driver and damage to equipment and material. Surfaces in the water treatment building can be slippery when wet. Walk on the floor pads and main walking areas when possible. Avoid stepping into puddles or wet areas. Wear nonslip shoes with good traction when working is the water treatment building.

A major contribution to accident experience comes from material handling. Handholds shall be provided on portable dockboards to permit safe handling when the dockboard must be repositioned or relocated.

Sediment sampling could be performed from boats and in open water. Approved water flotation vests will be worn by all personnel working on boats. A minimum of two people will be required to conduct sampling from the boats.

4.3.12 Excavation Safety

A qualified subcontractor will be retained by TRC if any excavations must be conducted on the Site. OSHA fact sheet pertaining to worker safety around excavations are presented in Appendix C.

4.3.13 Vehicle Traffic

Vehicle traffic is a physical hazard both on and off-site. TRC personnel will take special precaution each day to identify the vehicle traffic hazard for that particular work zone. A location-specific exclusion zone will be developed with strong consideration for preventing vehicle traffic for entering and impacting the work zone. The use of caution tape, traffic cones and other physical barriers (e.g., drums) will be utilized to the full extent possible.

4.3.14 Spills

The potential for spills is apparent during tank operation. Additionally, spill potential is realized during equipment failure, equipment maintenance, and vehicle use.

Spill prediction, prevention, and control shall be achieved through the use of proper unloading procedures, the use of spill control devices, and the practice of regular maintenance and inspections of the tanks and/or storage systems (for maintenance and inspections see the O&M Plan). Through implementation of the standard operating procedures, spill control devices, inspections and security measures outlined within this document and the O&M Plan, field personnel shall minimize the potential for a spill or release.

EWMI has been retained as an emergency response contractor to respond to spills. They are located at 14 Brick Kiln Road in Northanpton, PA. The emergency number is 1-877-460-1038. TRC personnel are not expected to respond to spills, they are to shut down equipment if it is safe to do so, leave the building and call EWMI.

4.3.15 Boats and Drowning

Certain sediment/surface water sampling may be conducted from boats on the water bodies. This results in unique potential physical hazards. Should a boat be used, a minimum of two crew members must be on any boat during the sampling event. During sampling, one crew member must have in their possession a 2-way radio or cell phone, capable of contact with the on-shore TRC sample management team.

With respect to working over or near bodies of water 3 or more feet deep or swiftly moving water, workers should observe the requirements of the Occupational Safety and Health Administration (OSHA) specified in Title 29 of the Code of Federal Regulations (CFR), Part 1926.106, "Working Over or Near Water." All field personnel must wear a personal flotation device (PFD) within 15 feet of a water body. Personnel will be provided with U.S. Coast Guard (USCG)-approved life jackets or work vests. The PFD should be Class III, which will support the head of an unconscious person above water. Life jackets and work vests will be inspected before each use. An USCG-approved life-saving skiff will be available. Under no circumstances will team members enter water bodies without protective clothing such as rubber boots or waders. At least one person will remain on shore as a lookout.

When the water temperature is below 45 ^{o}F, hypothermia is a serious risk. A person can lose feeling in the extremities within 5 minutes. All field staff members should be familiar with cold water survival techniques or should receive training from an American Red Cross-certified swimming instructor in cold water survival techniques when site conditions warrant such knowledge. If a team member falls into cold water, he or she should not remove any clothing while in the water because clothing provides additional insulation. Although clothing creates an added drag while swimming, the insulation outweighs the disadvantage of the additional drag. Each team member should carry a wool hat to place on his or her head in case he or she falls into the water. A wool hat, even when wet, provides good insulation for the head, where a large amount of body heat is lost.

The water temperature may be relatively cold. Immersion in water speeds the loss of body heat and can lead to hypothermia. Hypothermia is the abnormal lowering of internal body temperature. If the boat capsizes it will likely float on or just below the surface. To reduce the effects of hypothermia, get in or on the boat. Try to get as much of your body out of the water as possible. If you can't get in the boat a personal floating device will enable you to keep your head out of the water. This is very important because about 50% of body heat loss is from the head.

In addition to water related hazards, potential contaminants may exist in the sediments and surface water to be sampled. Descriptions, exposure levels, first aid and other pertinent information concerning the primary contaminants of concern can be reviewed in Section 4.0.

Equipment

For surface water and sediment sampling, the following safety equipment is required if a boat is to be used:

- Lifejacket (a minimum of one properly fitted PFD for each individual)
- 2-way radio with on-shore sampling team
- First Aid Kit
- Throwable Personnel Floatation Devices
- Visual Distress Signals
- Fire Extinguishers (fully charged)
- Anchor and Tackle
- Manual Bilge Pump or Bailing Device

If a boat is not going to be used, then the following safety equipment is required for sediment and surface water sampling at the edge of a surface water body:

- Hip waders
- Life jacket
- Caution will be taken when sample collection will occur on the boat.

5.0 EMERGENCY RESPONSE

This section details emergency response actions site personnel shall conduct in the event of an incident. Any incident will be recorded on an Incident Report Form (see Appendix D). These actions are presented in the following subsections.

The Site Safety Officer, as described in Section 3, is the Emergency Coordinator. If any personnel discover a fire, spill, malfunctioning equipment, or other emergency, immediately contact the Emergency Coordinator (see Section 3). The Emergency Coordinator is responsible for ensuring implementation of the following:

- Emergency command;
- Communications;
- Fire fighting;
- Security;
- Rescue operations;
- Emergency medical services;
- Accounting for field personnel;
- Immediate notification of injury, hospitalizations or deaths to TRC Corporate Safety;
- Damage assessment;
- Mitigation and investigation;
- Securing entrance gates; and
- Release of public information.

In the event a large-scale response effort is required, multiple response coordination will be organized by TRC's spill response contractor and Local and State officials. TRC Emergency Coordinator shall participate during the response.

A release or threat of release of OHM to the environment, including a release to a secondary containment structure, is considered a potential emergency. Field personnel should be able to recognize when a situation evolves beyond his or her ability to control or mitigate the spill, leak, or other emergency incident without help.

If an incident occurs, the following information should be provided to the Emergency Coordinator:

- Nature of emergency;
- Location of incident;
- Size and extent of emergency;
- Materials involved; and
- Extent of injuries to personnel, if any.

For situations where there is a release of OHM to the environment, the Emergency Coordinator or alternate (see Table 3-1) shall be contacted **as soon as possible**, and in all cases, within two-hours of identifying the release. The Emergency Coordinator has command authority and shall direct the appropriate emergency response.

Notification of emergency response agencies and other organizations, and the resulting mobilization of their resources, **will not be delayed** pending collection of all information. Missing information shall be supplied during follow-up calls to the agencies.

In the event of a discharge of OHM, rapid notification of other personnel onsite, the OHM response contractor, and federal, State, and local regulatory agencies or emergency response personnel (police, fire, ambulance) is essential to protecting the environment. **If the spill or release involves fire or injury, call 911**.

5.1 Spill Reporting and Documentation

In the event of a release of OHM, rapid response by field personnel, TRC's spill response contractor, and state and federal regulatory agencies may be essential to protecting the environment in the vicinity of the Site.

TRC personnel shall be responsible for all reporting and documenting reportable quantities of spilled oil and/or hazardous materials. The following actions are to be taken by the Emergency Coordinator or alternate in the event of a reportable quantity release:

- National Response Center (NRC) will be notified by calling (800) 424-8802 in accordance with the requirements of 40 CFR Part 117 and 40 CFR Part 302 as soon as they have knowledge of the release.

- State of New Jersey requires that all releases and spills of petroleum and most hazardous materials be reported to the following:

NJDEP Bureau of Emergency Response (BER)

A "release" is defined as "any unauthorized pumping, pouring, emitting, emptying, overfilling, spilling, leaking, leaching, or disposing, directly or indirectly, of a hazardous substance or any other substance which results in the formation of a hazardous substance upon release so that the substance or any related constituent thereof, or any degradation product of such a substance or of a related constituent thereof, may enter the environment." Under these

regulations, a "spill" is defined as "any escape of a substance from the containers employed in the normal course of storage, transfer, processing, or use."

The Emergency Coordinator shall immediately notify the NJDEP, but in no case later than 2 hours after the discharge. Notification to the NJDEP shall be made by telephone call to the BER spill hotline. The person notifying the BER shall provide all of the following information, when available:

- name of the person making such report and his/her relationship (agent, employee, etc.) to any person (corporation, company, etc.) which might be responsible for causing such discharge;
- time and date of the discharge;
- probable source of the discharge;
- location of the discharge, both geographic and in relation to bodies of water;
- type of petroleum discharged;
- possible health or fire hazards resulting from the discharge;
- amount of discharged;
- all actions which are being taken or will be taken to clean up and remove the discharge;
- personnel presently on the scene; and
- other government agencies which have been or will be notified.

In the unlikely event that a spill has reached navigable waters in "harmful quantities" (40 CFR Section 110.6), the Emergency Coordinator or person with any knowledge of such conditions must immediately notify the federal NRC at:

National Response Center – (800) 424-8802 (24 hours per day)

When contacting the NRC, the following information should be provided:

- time, location, and source of the spill;
- type and quantity of material spilled;
- cause and circumstances of the spill;
- hazards associated with the spill;
- personal injuries;
- corrective action taken or planned to be taken;
- name and telephone number of individual reporting the spill; and
- any additional pertinent information.

In addition, the EPA Region II Response Center should be contacted immediately for any spill that reaches navigable waters (per 40 CFR Section 110.6) at the following number:

EPA Region II Hotline – (732) 548-8730 (24 hours per day)

5.2 Onsite Medical Equipment and Supplies

First aid/CPR kits and an eyewash station are located in the Treatment Building (see Figure 2 for illustrative location).

5.3 Facility Evacuation Plan

In all emergencies, the Emergency Coordinator will remain in direct charge, unless superseded by the alternate.

All personnel, visitors, and contractors must safely make their way to the **Control Building adjacent to the parking lot on the west side of the Site at the main entrance to the Site.** All must wait for an accountability check and release by the Emergency Coordinator or alternate.

Any time the alarm system has been activated, the Emergency Coordinator or alternate will record a "Fire/Alarm Report" in the project logbook.

5.4 Initial Response Actions

Upon being notified of the emergency situation, the Emergency Coordinator will determine the following:

- Hazards involved;
- Extent of the incident;
- Resources threatened;
- Exclusion zones needed; and
- Outside emergency response assistance needed.

More detailed information is provided below. It is understood that modification to these procedures may be instituted during an emergency if the Emergency Coordinator or alternate determines a better response action.

5.5 Medical Emergency

The response actions to be taken by the field personnel in the event of a medical emergency, personal injury, accident, exposure to hazardous materials, and/or fire are as follows:

1. Identify the nature of the medical emergency, determine the cause if possible, and take precautionary measures to protect injured or other personnel from further injury;

2. If the situation is life threatening, any personnel may contact emergency aid from outside agencies;

3. The Emergency Coordinator or alternate will summon emergency aid from outside agencies, as necessary;

4. Only professional medical response personnel should move victims of head, neck, or back injuries unless the situation is life threatening. Field personnel are not required to administer first aid. Any employee who does administer first aid does so at his/her own risk;

5. Field personnel will eliminate and continue to restrict any medical hazard;

6. In the event of a chemical exposure, the Emergency Coordinator will ensure appropriate Material Safety Data Sheet or chemical analysis profile is forwarded to the on-site emergency response personnel and to the appropriate hospital;

7. Field personnel will not enter confined spaces during emergencies at any time. Such entry will not be completed until the Emergency Coordinator has cleared the area via the confined space entry requirements of 29 CFR 1910.146 or the trained emergency response officials have given the all clear signal; and

8. The Emergency Coordinator will complete a follow-up incident report. The incident report form is provided as Appendix D.

Adult Cardiopulmonary Resuscitation (CPR) Summary:

The steps of one-operator CPR (adult victim):

1. Check for responsiveness.
2. Turn victim on his back as a unit, call for help.
3. Open the airway.
4. Look, listen, and feel for breathing.
5. Give two full breaths, at 1.5 seconds per breath.
6. Check the carotid pulse. Once you have determined that the victim is in cardiac arrest, get someone to call the ambulance. If you are alone you will have to call for help and begin CPR.
7. Bare the chest.
8. Find the landmark and position your hands correctly on the chest.
9. Give 30* chest compressions, at the rate of 80-100 compressions per minute at a depth of 1.5 to 2 inches.
10. Open the airway and give 2 ventilations.
11. Continue alternating, 30 compressions and 2 ventilations until help arrives.
12. Every few minutes, after ventilation, stop CPR and check for the presence of a pulse. If none is present, continue CPR.

*According to the American Heart Association.

5.6 Emergency Procedures for Power Outages

In the event of a power outage at the Site, personnel should contact the Emergency Coordinator.

5.7 Emergency Procedures for Oil and/or Hazardous Materials Spills

All spills due to container failure must be reported to the Emergency Coordinator. All non-container failure spills of 1 gallon or less that cannot be cleaned up within 15 minutes must be reported to the Emergency Coordinator.

If the individual identifying the release is trained in emergency response and the spill can be controlled at the time of the release by the individual without endangering themselves or any other person in any way, then the individual shall take action to mitigate the release. However, in most circumstances, the release shall be fully evaluated by the Emergency Coordinator or alternate prior to implementing response actions.

Oil and/or Material Spill Response Hazardous

In the event of an OHM spill, personnel should take the following steps:

1. If an immediate threat to acute exposure or life is involved, personnel must immediately evacuate the area;

2. If it can be completed safely, attempt to control or stop the source of the spill. Satellite spill kits are located in the treatment building.

3. If possible, attempt to control the migration of the spill;

4. Prevent other personnel from entering the area of the spill, unless they are trained in emergency response and are present to assist;

5. Contact the Emergency Coordinator or alternate;

6. The Emergency Coordinator or alternate is responsible for identifying the extent of the incident and notifying the local officials and regulatory authorities (see Table 3-1); and

7. The Emergency Coordinator will determine if the Facility's 24-hour emergency response contractor should be contacted and/or if the Fire Department should be notified. The Emergency Coordinator will determine the method of response for the team (e.g., level of PPE, shutting the system off, shutting off of electrical power to the area).

For a spill or leak of OHM which is small enough to be absorbed, neutralized, or otherwise controlled at the time of release by personnel in the immediate release area or by contracted personnel trained in emergency response (e.g., hazardous waste transporter), and which does not pose an adverse exposure hazard to personnel, then the spill will be handled in the following manner:

1. Make sure all unnecessary persons are removed from the hazard area. Field personnel involved in the cleanup shall put on protective clothing and equipment;

2. If flammable material is involved, remove all ignition sources, and use spark and explosion proof equipment and clothing;

3. If possible, try to stop the leak;

4. Use absorbent pads, booms, earth, and bagged absorbent to contain, divert, neutralize and clean up the spill. Prevent the spilled material from leaving the containment area and reaching a storm drain;

5. Following source and release control, place all containment and cleanup materials in drums for proper disposal; and

6. Place all recovered liquid wastes in drums for removal to an approved disposal facility.

Following cleanup, all emergency equipment and spill containment equipment shall be returned to ready status (restocked).

If the OHM spill is large, the Facility's emergency response contractor and/or the Fire Department will be delegated the authority for directing the locations of the following:

- Exclusion Zone;
- Contaminant Reduction Zone;
- Support Zone; and
- Staging Area.

During this activity, the Emergency Coordinator or alternate will provide site security and qualified personnel to support the Emergency Response Contractor and/or the Fire Department.

5.8 Emergency Procedures for Severe Weather

During a severe storm (e.g., tornado warning; blizzard; severe cold; etc.), a site-specific emergency may be realized. General emergency response procedures required as a result of the severe weather are addressed in other sections of this plan (e.g., spill, power outage). In the event of severe weather, personnel shall initiate the following procedures.

1. Notify the Emergency Coordinator as soon as a severe weather warning has been announced.

2. The Emergency Coordinator will monitor the severe storm warning and alert personnel of the situation.

3. The Emergency Coordinator will request all loose equipment be secured to minimize damage from high winds.

4. Exterior storage of materials will be relocated to interior locations where possible.

5. The Emergency Coordinator will coordinate any required shut down procedures necessary.

6. The Emergency Coordinator or alternate will perform a safety inspection following the implementation of this plan.

7. Once complete, the Emergency Coordinator or alternate will identify any repairs or remedial actions necessary and determine when operations will continue.

5.9 Emergency Procedures for Hostile Threat

The Facility shall be designed to prevent unauthorized access. However, a hostile threat may be delivered via in-person, off-site, telephone, package, or internet.

A hostile threat constitutes a site-specific emergency. In the event of a hostile threat, Facility personnel will respond as follows:

- Get detailed information on the source of the threat as may be available, including the description of the suspicious items, markings, or identifying addresses, **BUT DO NOT TOUCH OR MOVE ANY SUSPECIOUS PACKAGE OR ITEM**. Save any e-mail threat;

- Notify the Emergency Coordinator;

- The Emergency Coordinator will immediately contact the local fire and police department, as appropriate;

- At this point, the primary responsibility for the situation will be delegated to the Fire Department and the Police Department; and,

- Personnel will not re-enter the Site unless directed by the Emergency Coordinator.

6.0 SITE SECURITY & WORK ZONES

A locked, gated, chain link fence surrounds the Facility.

The treatment building is located inside the fenced Facility (in treatment building D216 on the site plan). The gate is to be locked during normal operations with access provided by Facility personnel. During Pump and Treatment system activities personnel will be working inside and outside of the Treatment Building. Normal site lighting and emergency temporary lighting shall be provided in the Treatment Building.

During certain activities (e.g., ground water sampling, offsite investigations, offsite remediation), activities may occur outside of the secured site boundaries. Personnel will establish and maintain temporary exclusion zones. This will be completed with cones, tape, signage, or other similar means to keep the general public out of the work zones. At all times equipment and samples will be stored in locked vehicles or placed under the control of field staff.

Work zones will be established by the Site Safety Officer per work task to prevent or minimize exposure of unauthorized personnel to hazards by establishing boundaries to reduce migration of contaminants from designated work areas covered by the HASP into clean areas. A three-zone approach will be used for field activities covered under this HASP. The zones will be identified during safety briefings and may be clearly marked by traffic cones, caution tape, barricades, signs, or other means. These zones are designated as the Support Zone, the Contamination Reduction Zone (CRZ), and the Exclusion Zone.

6.1 Support Zone

The Support Zone is the clean area in which the possibilities of encountering hazardous materials or conditions are minimal. Therefore, personal protective and respiratory equipment are not necessary. Inside the Support Zone, the following will be available: an effective means of communication, first-aid supplies, fire extinguisher, drinking water, and other appropriate support facilities. The support Zone shall also serve as the main point of contact for the visitor check-in and initiation of emergency services when necessary. In general, the support zone will be the Treatment Building. In the event work tasks are located far from this location, local support zones will be established.

6.2 Contamination Reduction Zone

The CRZ is the area where equipment and personnel are decontaminated before leaving the Exclusion Zone. Personnel will remove and/or decontaminate PPE and place it in appropriate containers. Site vehicles and equipment will also be decontaminated in the CRZ. The CRZ will consist of a temporary decontamination area, a means of washing protective equipment, site equipment; containers for liquids, solids, and PPE; first-aid supplies; an eyewash kit; and a fire extinguisher. Eating, drinking, chewing gum or tobacco, smoking, or any proactive that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in the CRZ.

Personnel performing decontamination operations will be provided with appropriate PPE, including face shield, rain suits or chemical resistant PPE as needed, water/chemical resistant boot covers, gloves and hearing protection.

6.3 Exclusion Zone

The Exclusion Zone includes the designated work activities at the Site. Only authorized, trained, and qualified personnel with the appropriate PPE shall be admitted into the Exclusion Zone.

Work activities within the Exclusion Zone pose the greatest possibility of exposure to personnel and equipment. The SSO shall be responsible for controlling the access points and keeping bystanders and unauthorized personnel to a minimum. The Exclusion Zone will be clearly marked with flagging, barricade tape, traffic cones, or other signals to limit access.

Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in the Exclusion Zone.

6.4 Work Zone Control

Work zone layouts and locations will be established by the SSO at the time of the work and may be marked with barrier tape, barrier ribbon, or other suitable warning devices, where necessary.

7.0 AIR MONITORING

Exposure to hazardous atmospheres during site activities is not anticipated, so air monitoring is currently not required.

Should site conditions change, and the Site Safety Officer determines that a change to air monitoring is required, a memo, filed with this HASP will be prepared.

According to 29 CFR 1910.120 (h) air monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards to determine the appropriate level of employee protection needed on site. Air monitoring will be conducted during the required work.

Air monitoring at the Site will consist of following types of monitoring:

Initial Monitoring – Air monitoring is initially conducted at a new work site to identify and evaluate potentially hazardous conditions that are previously uncharacterized.

Periodic Monitoring – Air monitoring is periodically repeated when hazardous atmospheres have the potential to develop during remediation activities. Examples of when this may occur are when work begins on a different portion of the Site.

Perimeter Monitoring – Air monitoring is conducted to verify that designated "clean areas" (where upgraded levels of PPE are not required) remain free of airborne hazards.

Exposure Limits

The exposure limits used in this program are OSHA's permissible exposure limits (PELs) as listed in 29 CFR Part 1910, Subparts G and Z. If a PEL does not exist for any particular substance, the exposure limits published in "NIOSH Recommendations for Occupational Health Standards" dated 1986 (incorporated by reference) will be used. If none are specified by NIOSH, the exposure limits specified by the American Conference of Governmental Industrial Hygienists (ACGIH) in their most current publications of "Threshold Limit Values and Biological Exposure Indices" will be used.

For those chemicals, such as benzene and lead, which have an individual OSHA standard written for a specific chemical, the "action level" prescribed in that standard will be used as the exposure limit where possible.

For substances which do not have published exposure limits as described above, the

published literature and MSDS may be used as a guide for determining the proper level of protection.

Levels of protection will be upgraded as necessary based on action levels of the site-specific contaminant of concern. Only the Site Safety Officer, with the consent of the Corporate Health & Safety Officer can downgrade to a lower level. Changes will be made in writing

7.1 Air Quality Monitoring and Action Levels

The instruments and procedures that will be used for air monitoring activities to determine if the potential hazards identified in Section 4 are present are described below. These activities may not be necessary at every work location and may be modified at the discretion of the SSO. At a minimum, monitoring will include evaluations for combustible atmospheres, oxygen-deficient environments, and potentially hazardous vapor concentrations.

The Dust Exposure Calculation is included in Appendix E. The permissible exposure limit (PEL) assumes the highest levels for each contaminant that would be found in airborne particulates simultaneously, as a worst case scenario for exposure to airborne contaminants. The resulting "Mixed Dust Action Level" is the airborne particulate PEL based on using a direct reading particulate dust monitor.

Applicable Monitoring Equipment Calibration/Information

Photoionization detector (PID)

A single calibration conducted prior to an activity will be considered acceptable for a period of use one day. If the reading deviates more than +15 percent from concentration of the calibration gas, the instrument requires maintenance.

RAM

The RAM monitors for airborne particulates and dust (real time aerosol monitor) capable of detecting a particle size range of less than 0.11 to 20 micrometers in diameter and a concentration range of 1 microgram/meter^3 to 200 milligrams/meter^3.

MiniRAM

The Miniram monitors for airborne particulates and dust. This real-time monitoring instrument is capable of sensing and measuring aerosol concentrations over the range of 0.01 to 100 mg/m^3.

The following information will be recorded daily by the SSO for each piece of monitoring equipment:

- Name and model number of the equipment
- Calibration information
- Field work to be performed
- Air monitoring results and monitoring locations
- PPE worn
- Accidents or incidents
- Unusual occurrences or personnel complaints

The presence of airborne contaminants will be evaluated through the use of direct-reading instrumentation. Information gathered will be used to ensure the adequacy of the levels of protection being employed in work areas at the site, and may be used as the basis for upgrading or downgrading levels of protection, at the discretion of the SSO.

Organic Vapors

A PID with a 10.6eV lamp will be used to monitor breathing zone concentrations of organic vapors. If necessary, Draeger Tubes will be used to determine the individual VOCs present. Monitoring for organic vapors will be conducted during all intrusive activities such as test pits and soil drilling. Calibration of the monitoring equipment will be performed daily before start-up of work. In addition, the frequency and use of both PIDs will be at the discretion of the SSO.

Airborne Dust

A mini-RAM dust detector (mini-RAM) or equivalent will be used to monitor levels of airborne dust in a work area where there is a potential to exceed the action levels as described in the table below. Monitoring for dust will be conducted during, but not limited to, all intrusive activities. Equipment calibration will be performed in accordance with manufacturer instructions.

PID	MiniRAM Airborne Dust3			Action
Organic Vapors[2]	Exclusion Zone	Exclusion Zone Perimeter	Site Property Line	
Background	<0.368 mg/m^3	<0.18mg/m^3	<0.150mg/m3	Level D or modified D at the discretion of the SSO
>5 ppm and <10 ppm	>0.368 mg/m^3 to < 3.68 mg/m^3 (3)	>0.18mg/m^3	>0.150 mg/m^3 or visible dust	Upgrade to Level C[4] protection. (1) Continue work with Extreme Caution (2) Use a respirator with a P-100 filter cartridge
>10 ppm and <50 ppm	>0.368 mg/m^3	>0.18mg/m^3	>0.150 mg/m^3 or visible dust	Suspend work in immediate area and notify SSO. Conduct air monitoring periodically to determine when and if work may be continued. Upgrade to Level B protection.
>50 ppm	--	--	--	**POTENTIALLY HAZARDOUS ATMOSPHERE.** Immediately shut off all possible ignition sources and evacuate work area. Secure perimeter. Notify SSO. Monitor vapor concentrations from a distance until LEL remains below 10 % for at least 15 minutes.

Notes:

1. Organic Vapors: Monitor organic vapors during all intrusive activities (all soil and sediment sampling and monitoring well installation). Action levels for organic vapors are based on 15-minute time-weighted average concentrations. If PID readings exceed background, an analysis for benzene should be performed using colorimetric tubes (Benzene 0.5c/Draeger tube or equivalent). If benzene readings greater than 0.5 ppm and less than 5 ppm, suspend work and institute engineering controls. If readings do not decrease, upgrade to Level C. If benzene reading is greater than 5 ppm, suspend work in immediate area and notify field supervisor. Conduct air monitoring periodically to determine when work may be continued.
2. Dust: Monitor airborne dust during excavation activities. The OSHA PEL for nuisance dust is 5 mg/m^3. Dust action levels for Exclusion Zone (0.368 mg/m^3) and Exclusion Zone Perimeter (0.18 mg/m^3) are based on 15-minute time-weighted average concentrations and take into consideration fill soil contaminant concentrations. Dust action level for Site property line (0.150 mg/m^3) is based on 24-hour average concentrations, NAAQS 40 CFR Part 50.
3. If colorimetric tubes (Benzene 0.5c/Draeger tube or equivalent) are not used, upgrade to Level B.
4. Must be quantitatively fit tested to upgrade to Level B.

8.0 PERSONAL PROTECTIVE EQUIPMENT, SPILL KITS, AND FIRST AID KITS

Site activities will be completed in Level D PPE. When coming in contact with OHM and groundwater, personnel will wear disposable gloves. Routine change-out of disposable gloves is expected and a basic line of defense against cross-contamination. Field clothes, coveralls, or tyvek suits contaminated with OHM will be changed-out prior to leaving the exclusion zone. Contaminated work clothes are not allowed in personal or work vehicles.

Any personnel using respiratory protection equipment must be currently medically certified to do so, and have passed a qualitative fit test within the preceding year.

Based on the results of previous investigations at the site, Level D PPE will be initially used on all tasks, except Acid Transfer (see Appendix B). The Site Safety Officer can upgrade to Level C in risks are identified. Such upgrades will be recorded via a memo attached to this HASP.

8.1 Level D Protection

EPA Level D PPEis acceptable for areas with no inhalation hazard, or where the hazard has been demonstrated to be below the action levels. Level D protection will include:

- Worker overalls or other suitable work clothes;
- Safety boots with steel toe and shank;
- Hard hat;
- Safety glasses; and
- Face shield or goggles if a splash hazard is present.

Nitrile gloves with latex inner gloves and an impermeable splash suit are to be used when handling liquid materials or samples.

Task Specific Reminders:

Pumping Equipment – Pumps will be used for the removal of groundwater from wells throughout the Site. Maintenance of pressurized pipes that could rupture and violently release liquid materials to the workers will be controlled by inspecting all pipe fittings for secure connections (all cam lock fittings must be secured with wire). All employees must don splash gear when moving or disconnecting pumps and associated piping, if a splash hazard is present. All pipes will be drained and depressurized before disconnection.

8.2 Level C Protection

Level C Protection is suitable for use when limited concentrations of the chemicals of concern are present. Level C will consist of the following equipment:

- Tyvek coveralls or equivalent when working with solid materials;
- Poly coated Tyvek coveralls when handling contaminated liquids;
- Safety boots with steel toe and shank;
- Safety glasses or goggles;
- Hard hat;
- Nitrile gloves with latex inner gloves; and
- Half-or Full-face Air Purifying Respirator (APR) with appropriate cartridges and dust prefilters, if dust is present.

APR's may only be used in non-IDLH atmospheres, and assuming that appropriate cartridges are available for use. APR cartridges are to be replaced at the beginning and mid-point of each workday and whenever breakthrough is noted. Breakthrough is any indication of an unusual taste, odor, or sensation or indicated by end of service life indicators.

Task Specific Reminders:

Small Quantity Acids – Small quantities of corrosive acids will be stored in DOT approved drums and labeled with contents and hazard information. All employees must don chemical resistant gloves, coveralls, eye protection and splash gear including splash face shields when moving or handling acid.

8.3 Spill Kits & First Aid Kits

Spill kits and first aid kits are located adjacent to the entrance doors in the Main Building. Whenever spill kits and first aid kits are utilized, when material is removed from either kit, it will be recorded on an equipment list provided within each kit. The Emergency Coordinator also will be notified of materials used in during the response and will order replacement supplies.

9.0 DECONTAMINATION PROCEDURES

The degree of decontamination required is a function of both a particular task and the physical environment within which it takes place. The following decontamination procedure, although somewhat specific to the tasks described herein, will remain flexible, thereby allowing the decontamination crew to respond appropriately to the changing environmental conditions that may arise at the Site. The procedure shall be followed by all personnel who are on the Site.

Station 1: Equipment Drop	1. Deposit Equipment used on-site (e.g., tools, containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination.
Station 2: Boots and Gloves	2. Scrub outer boots and outer gloves Wash and Rinse with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3: Tape, Outer Boot and Glove Removal	3. Remove tape, outer boots and gloves. Deposit tape and gloves in container.
Station 4: Canister or Mask Change	4. If worker leaves exclusive zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, and worker returns to duty.
Station 5: Outer Garment Removal	5. Protective suit removed and deposited in separate container.
Station 6: Face Piece, Hard Hat, Safety Goggles Removal	6. Face piece or safety glasses removed (if used). Avoid touching face with fingers. Facepiece and/or safety glasses deposited on plastic sheet. Hard hat removed and placed on plastic sheet.
Station 7: Inner Glove Removal	7. Inner gloves are the last PPEto be removed. Avoid touching the outside of the gloves with bare fingers.

9.1 Medical Emergencies

In the event of a minor, non-life threatening injury, personnel should follow the decontamination procedures as defined, and then administer first-aid.

In the event of a major injury or other serious medical concern (i.e., heat stroke), immediate first-aid is to be administered and the victim transported to the hospital in lieu of

further decontamination efforts unless exposure to a site contaminant would be considered "Immediately Dangerous to Life or Health."

9.2 Equipment Decontamination

Detailed equipment decontamination procedures are provided in the OU2 Supplemental RI Workplan.

10.0 PLAN ACKNOWLEDGEMENT, REVIEW AND MODIFICATION

TRC personnel are required to sign the acknowledgement page, Appendix F, which confirms this plan has been read with a full understanding of the requirements outlined, and any questions regarding the implementation of this plan have been answered by the Site Manager and/or the corporate health and safety coordinator.

The Contractors signature on this plan (Appendix F) indicates acknowledgement that while the Contractor is required to comply with TRC's site-specific Plan, ultimate responsibility for health and safety of the Contractor personnel will be that of the Contractor. TRC expressly denies liability for the health and safety of Contractor's workers.

After any event which requires an emergency response outlined in this plan, a formal critique will be performed. At minimum, the TRC Site Manager will evaluate the effectiveness of this plan and the employee's action. If an outside agency was involved, the TRC Site Manager will request recommendations for any modifications to the procedures outline herein. As necessary the plan will be modified.

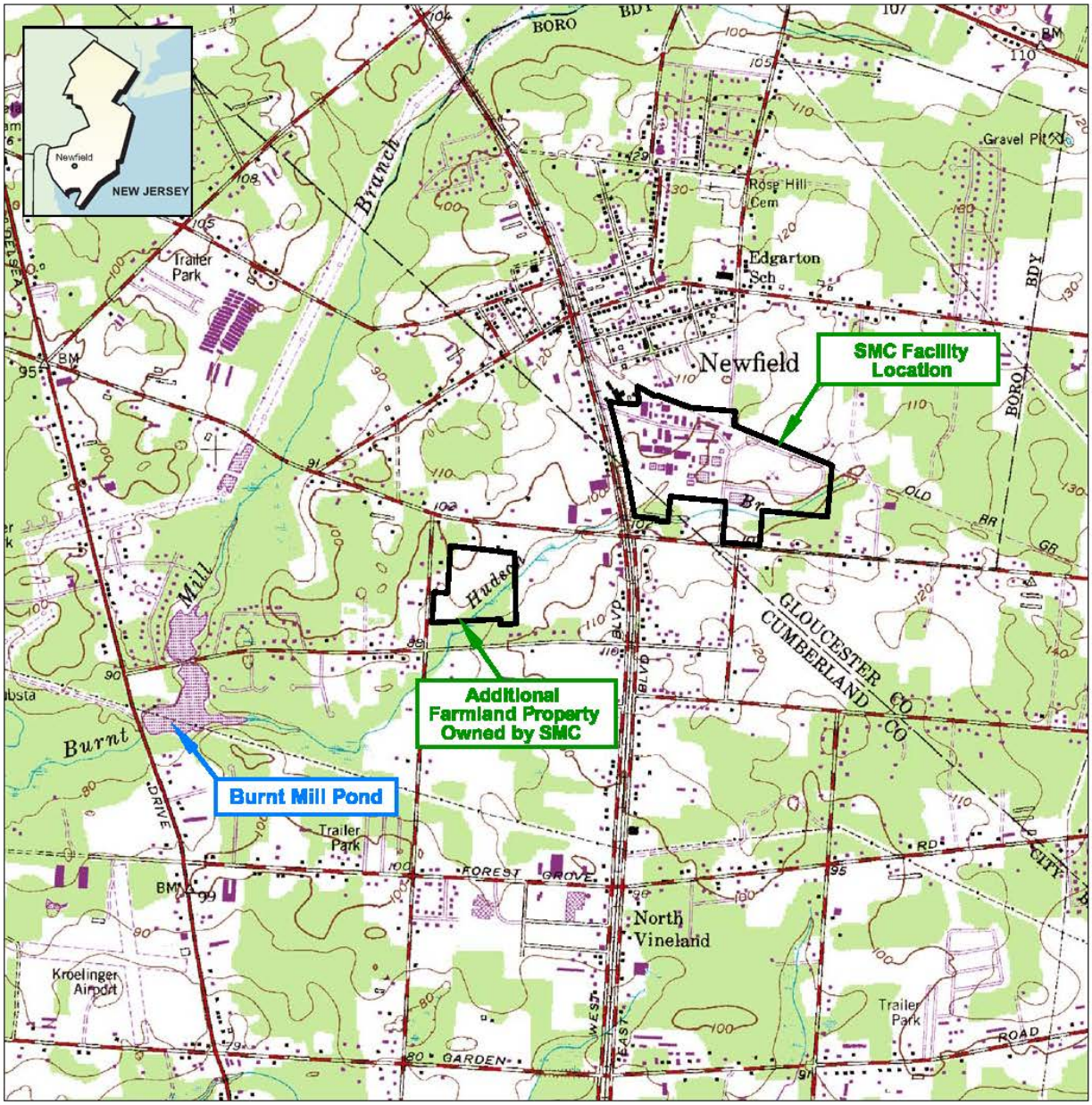
At least once per year, all field personnel involved with the response action will be required to review this plan.

In the event that this Plan warrants adjustment, the Corporate Health and Safety Director can issue an addendum, which will be attached to the Plan.

_____ _____

Acknowledged—Gary Ritter, CHP Date

FIGURES



SOURCE: NEWFIELD, N.J. QUADRANGLE, 1953, PHOTOREVISED 1994, 7.5 MINUTE SERIES (USGS TOPOGRAPHIC MAP)

SITE PROPERTY BOUNDARY

N

0 2000 FT.

APPROXIMATE SCALE

TRC ENVIRONMENTAL CORP.
57 East Willow Street
Millburn, New Jersey 07041

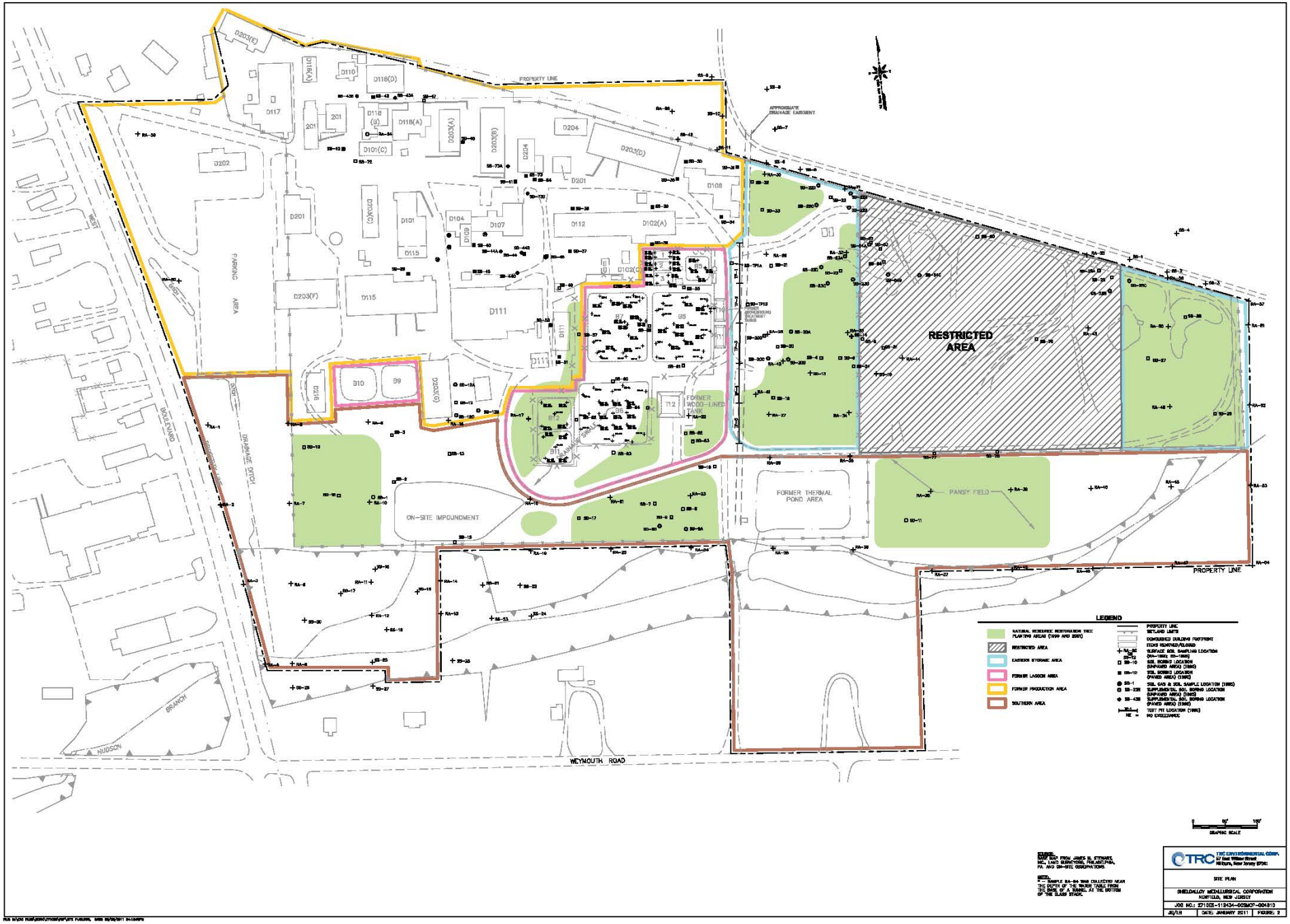
SITE LOCATION MAP

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

JOB NO.: 2710ES-112434-00SOIL-002500

JG/LB	DATE: JANUARY 2011	FIGURE: 1

M:\CAD FILES\WORK\2710ES\FSP\FIGURE 1.DWG 01/28/2011 10:10:50AM TAB: LAYOUT


RESTRICTED AREA
FORMER THERMAL POND AREA
PANSY FIELD
ON-SITE IMPOUNDMENT
FORMER WOOD-LINED TANK
PARKING AREA
PROPERTY LINE
WEYMOUTH ROAD
HUDSON
BRANCH
BOULEVARD
DRAINAGE DITCH
LEGEND
NATURAL RESOURCE RESTORATION TREE PLANTING AREAS (1999 AND 2001)
RESTRICTED AREA
EASTERN STORAGE AREA
FORMER LAGOON AREA
FORMER PRODUCTION AREA
SOUTHERN AREA
PROPERTY LINE
WETLAND LIMITS
DEMOLISHED BUILDING FOOTPRINT
ITEMS REMOVED/FILLED
SURFACE SOIL SAMPLING LOCATION (RA-1 SERIES, RA-1 SERIES)
SOIL BORING LOCATION (UNPAVED AREA) (1999)
SOIL BORING LOCATION (PAVED AREA) (1999)
SOIL, GAS & SOIL SAMPLE LOCATION (1999)
SUPPLEMENTAL SOIL BORING LOCATION (UNPAVED AREA) (1999)
SUPPLEMENTAL SOIL BORING LOCATION (PAVED AREA) (1999)
TEST PIT LOCATION (1999)
NE = NO EXCEEDANCE
GRAPHIC SCALE
SITE PLAN
SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY
JOB NO.: 27103-119434-003M07-004910
DATE: JANUARY 2011
FIGURE: 2

R2-0000160

APPENDIX A

MATERIAL SAFETY DATA SHEETS

ITEM: 5E520 - Primer 8 Oz Purple PVC CPVC

MSDS: A6353 **ORDER: 0074131139** **LP NUMBER: UCN9094839**

MATERIAL SAFETY DATA SHEET (MSDS)

This MSDS should be attached or kept with the respective product with which it is associated.

MATERIAL SAFETY DATA SHEET - A6353

Associated Grainger Items
5E520, 5E521, 5E522, 1RG56, 1RG57, 1RG58

MATERIAL SAFETY DATA SHEET

PREPARED TO U.S. OSHA, CMA, ANSI AND CANADIAN WHMIS, AND EUROPEAN COMMUNITY STANDARDS

PART I: WHAT IS THE MATERIAL AND WHAT DO I NEED TO KNOW IN AN EMERGENCY?

1. PRODUCT IDENTIFICATION

GRAINGER 1RG56, 1RG57, 1RG58, 5E520, 5E521, 5E522

TRADE NAME (AS LABELED): PURPLE PRIMER

PRIMER PRODUCTS: LOW VOC PURPLE PRIMER

CHEMICAL NAME/CLASS: SOLVENT MIXTURE

PRODUCT USE: PREP. SURFACES FOR SOLVENT CEMENTING

SUPPLIER/MANUFACTURER'S NAME: COOKSON ELECTRONICS

U.S. ADDRESS:
1661 OLD DIXIE HIGHWAY
RIVIERA BEACH, FL 33404

U.S. BUSINESS PHONE:
1-800-327-8460
1-561-844-0241

U.S. EMERGENCY PHONE:

CHEMTREC:
1-800-424-9300 (U.S. AND CANADA)
1-703-527-3887 (INTERNATIONAL)

DATE OF PREPARATION: JAN 30, 2004

2. COMPOSITION AND INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS#	EINECS #	% W/W
ACETONE	67-64-1	200-662-2	0-70
METHYL ETHYL KETONE	78-93-3	201-159-0	0-82
CYCLOHEXANONE	108-94-1	203-631-1	0-20
TETRAHYDROFURAN	109-99-9	203-726-8	0-20

CHEMICAL NAME	EXPOSURE LIMITS IN AIR ACGIH TLV PPM	ACGIH STEL PPM	OSHA PEL PPM	OSHA STEL PPM	NIOSH IDLH PPM	OTHER
ACETONE 500	750 A4 (NOT CLASSIFIABLE AS A HUMAN CARCINOGEN)	1000	NE 750 (VACATED 1989 PEL)	2500 1000 (VACATED 1989 PEL)	NIOSH REL: (BASED ON LEL)	TWA: 250 DFG MAK: 500 CARCINOGEN: EPA-D
METHYL ETHYL KETONE	200	300	200	300 (VACATED 1989 PEL)	3000	NIOSH REL: TWA: 200 STEL: 300 DFG MAK: 200 CARCINOGEN: EPA-D
CYCLOHEXANONE	25, SKIN A3 (CONFIRMED ANIMAL CARCINOGEN WITH UNKNOWN RELEVANCE TO HUMANS)	NE	50 25 (VACATED 1989 PEL)	NE	700	NIOSH REL: TWA: 25, SKIN DFG MAK: DANGER OF CUTANEOUS ABSORPTION CARCINOGEN: IARC-3 MAK-B
TETRAHYDROFURAN	200	250	200	250 (VACATED 1989 PEL)	2000 (BASED ON LEL)	NIOSH REL: TWA: 200 STEL: 250 DFG MAK: 50

NE = NOT ESTABLISHED.
C = CEILING LIMIT.

SEE ORIGINAL MSDS FOR DEFINITIONS OF RATINGS

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW:
THIS IS AN EXTREMELY FLAMMABLE LIQUID WITH AN ETHER-LIKE ODOR. THIS PRODUCT COMES IN A VARIETY OF COLORS. INHALATION OVEREXPOSURES TO THE VAPORS OF THIS PRODUCT CAN CAUSE CENTRAL-NERVOUS SYSTEM EFFECTS (INCLUDING DIZZINESS, DROWSINESS, NAUSEA, AND HEADACHES). THIS PRODUCT CAN BE MILDLY TO SEVERELY IRRITATING TO THE EYES, SKIN, AND OTHER CONTAMINATED TISSUE. VAPORS OF THIS PRODUCT ARE HEAVIER THAN AIR AND MAY TRAVEL TO A SOURCE OF IGNITION AND FLASHBACK TO A LEAK OR OPEN CONTAINER. TETRAHYDROFURAN, A COMPONENT OF THIS PRODUCT, IS KNOWN TO FORM EXPLOSIVE PEROXIDES UNDER CERTAIN CIRCUMSTANCES. EMERGENCY RESPONDERS MUST WEAR THE PROPER PERSONAL PROTECTIVE EQUIPMENT (AND HAVE APPROPRIATE FIRE PROTECTION) SUITABLE FOR THE SITUATION TO WHICH THEY ARE RESPONDING.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE:
THE MOST SIGNIFICANT ROUTES OF OCCUPATIONAL OVEREXPOSURE ARE INHALATION AND CONTACT WITH SKIN AND EYES. THE SYMPTOMS OF OVEREXPOSURE TO THIS PRODUCT, VIA ROUTE OF ENTRY, ARE AS FOLLOWS:

INHALATION:
INHALATION OF VAPORS, MISTS, OR SPRAYS OF THIS PRODUCT CAN BE IRRITATING TO THE NOSE, THROAT, MUCOUS MEMBRANES, AND OTHER TISSUES OF THE RESPIRATORY SYSTEM. SYMPTOMS OF OVEREXPOSURE CAN INCLUDE COUGHING, SNEEZING, AND SHORTNESS OF BREATH. ADDITIONALLY, THE COMPONENTS OF THIS PRODUCT ARE CENTRAL NERVOUS SYSTEM DEPRESSANTS. SYMPTOMS OF OVER-EXPOSURE CAN INCLUDE DROWSINESS, DIZZINESS, FATIGUE, HEADACHE, NAUSEA, AND GENERAL ANESTHETIC EFFECTS. INHALATION OF HIGH CONCENTRATIONS OF THIS PRODUCT (AS MAY OCCUR IN A POORLY-VENTILATED AREA) MAY BE FATAL. BASED ON CLINICAL STUDIES INVOLVING TEST ANIMALS, CYCLOHEXANONE AND TETRAHYDROFURAN, COMPONENTS OF THIS PRODUCT, MAY CAUSE LIVER AND KIDNEY DAMAGE AFTER LONG-TERM INHALATION OVEREXPOSURES.

THIS PRODUCT MUST BE USED WITH ADEQUATE VENTILATION. MECHANICAL EXHAUST MAY BE NEEDED. ENSURE EXPOSURE TO VAPORS IS MINIMIZED BY USE OF APPROPRIATE ENGINEERING CONTROLS, WORK PRACTICES, AND PERSONAL PROTECTIVE EQUIPMENT, AS DESCRIBED IN THE REMAINDER OF THIS DOCUMENT.

CONTACT WITH SKIN OR EYES:
CONTACT WITH THIS PRODUCT CAN BE IRRITATING TO CONTAMINATED SKIN AND EYES. VAPORS OF THIS PRODUCT CAN REDDEN AND IRRITATE THE EYES. IF THE EYES ARE CONTAMINATED WITH SPLASHES, SPRAYS OR MISTS OF THIS PRODUCT, REDDENING, TEARING, AND CORNEAL OPACITY CAN OCCUR. THE LIQUID CAN BE MILDLY TO SEVERELY IRRITATING TO CONTAMINATED SKIN (DEPENDING ON DURATION OF EXPOSURE). PROLONGED OR REPEATED SKIN OVER-EXPOSURES CAN LEAD TO DERMATITIS.

SKIN ABSORPTION:
SKIN ABSORPTION IS A POTENTIAL ROUTE OF OVEREXPOSURE FOR CYCLOHEXANONE (A COMPONENT OF THIS PRODUCT). SYMPTOMS OF SUCH EXPOSURE CAN INCLUDE THOSE DESCRIBED UNDER "INHALATION" AND "CONTACT WITH SKIN AND EYES".

INGESTION:
INGESTION IS NOT ANTICIPATED TO BE A SIGNIFICANT ROUTE OF OCCUPATIONAL OVEREXPOSURE FOR THIS PRODUCT. IF INGESTION OCCURS, REFER TO SECTION 4 (FIRST-AID MEASURES) AND GET MEDICAL HELP IMMEDIATELY. IF INGESTION OF THIS PRODUCT DOES OCCUR, SYMPTOMS OF SUCH OVER-EXPOSURE CAN INCLUDE NAUSEA, VOMITING, AND OTHER SYMPTOMS DESCRIBED FOR "INHALATION". INGESTION CAN ALSO LEAD TO LIVER AND KIDNEY DAMAGE. INGESTION OF THIS PRODUCT MAY BE FATAL.

INJECTION:
INJECTION IS NOT ANTICIPATED TO BE A SIGNIFICANT ROUTE OF OVER-EXPOSURE FOR THIS PRODUCT. IF INJECTION DOES OCCUR (I.E. THROUGH A PUNCTURE BY AN OBJECT CONTAMINATED WITH THE PRODUCT), LOCAL IRRITATION AND SWELLING CAN OCCUR. ADDITIONAL SYMPTOMS MAY INCLUDE THOSE DESCRIBED FOR "INHALATION".

HAZARDOUS MATERIAL INFORMATION SYSTEM:
HEALTH (BLUE) 2
FLAMMABILITY (RED) 3
REACTIVITY (YELLOW) 1
PROTECTIVE EQUIPMENT C/D

EYES: CHEMICAL GOGGLES

RESPIRATORY: SEE SECTION 8

HANDS: GLOVES

BODY: APRON

SEE ORIGINAL MSDS FOR DEFINITION OF RATINGS

HEALTH EFFECTS OR RISKS FROM EXPOSURE: AN EXPLANATION IN LAY TERMS.

ACUTE:
OVER-EXPOSURES TO THIS PRODUCT CAN BE IRRITATING TO THE EYES, SKIN, AND MUCOUS MEMBRANES, AND CAN ALSO CAUSE CENTRAL-NERVOUS SYSTEM EFFECTS (DIZZINESS, DROWSINESS, NAUSEA AND HEADACHES). INGESTION OF THIS PRODUCT, OR INHALATION OF HIGH CONCENTRATIONS OF THIS PRODUCT'S VAPORS, MAY BE FATAL.

CHRONIC:
PROLONGED OR REPEATED SKIN EXPOSURES CAN LEAD TO DERMATITIS (DRYNESS, REDDENING AND IRRITATION OF THE SKIN). TETRAHYDROFURAN, A COMPONENT OF THIS PRODUCT, MAY CAUSE LIVER AND KIDNEY DAMAGE AFTER LONG-TERM INHALATION OVEREXPOSURES. THERE IS LIMITED EVIDENCE FROM ANIMAL STUDIES THAT METHYL ETHYL KETONE, A COMPONENT OF THIS PRODUCT, IS A REPRODUCTIVE TOXIN. REFER TO SECTION 11 (TOXICOLOGICAL INFORMATION) FOR ADDITIONAL INFORMATION. A REPORT FROM THE NATIONAL TOXICOLOGY PROGRAM (NTP) HAS SUGGESTED THAT EXPOSURE OF MICE AND RATS TO TETRAHYDROFURAN (THF) VAPOR LEVELS UP TO 1800 PPM 6 HR/DAY, 5 DAYS/WEEK FOR THEIR LIFETIMES CAUSED AN INCREASED INCIDENCE OF KIDNEY TUMORS IN MALE RATS AND LIVER TUMORS IN FEMALE MICE. NO EVIDENCE OF TUMORS WAS SEEN IN FEMALE RATS OR MALE MICE. THE SIGNIFICANCE OF THESE FINDINGS FOR HUMAN HEALTH IS UNCLEAR AT THIS TIME, AND MAY BE RELATED TO "SPECIES SPECIFIC" EFFECTS. ELEVATED INCIDENCES OF TUMORS IN HUMANS HAVE NOT BEEN REPORTED FOR THF, THE NTP, IARC, OR OSHA DOES NOT LIST THF AS A CARCINOGEN. ONE THF VENDOR (DUPONT) HAS RECOMMENDED A REDUCTION IN THE "ACCEPTABLE EXPOSURE LIMIT" FROM 200 PPM TO 25 PPM, 8 AND 12 HOUR TIME WEIGHTED AVERAGE AND A STEL OF 75 PPM.

PART II: WHAT SHOULD I DO IF A HAZARDOUS SITUATION OCCURS?

4. FIRST-AID MEASURES

SKIN EXPOSURE:
IF THIS PRODUCT CONTAMINATES THE SKIN, IMMEDIATELY BEGIN DECONTAMINATION WITH RUNNING WATER. MINIMUM FLUSHING IS FOR 15 MINUTES. REMOVE EXPOSED OR

CONTAMINATED CLOTHING, TAKING CARE NOT TO CONTAMINATE EYES. THE CONTAMINATED INDIVIDUAL MUST SEEK MEDICAL ATTENTION IF ANY ADVERSE EFFECT OCCURS.

EYE EXPOSURE:
IF THIS PRODUCT'S LIQUID OR VAPORS ENTER THE EYES, OPEN VICTIM'S EYES WHILE UNDER GENTLY RUNNING WATER. USE SUFFICIENT FORCE TO OPEN EYELIDS. HAVE VICTIM "ROLL" EYES. MINIMUM FLUSHING IS FOR 15 MINUTES. THE CONTAMINATED INDIVIDUAL MUST SEEK IMMEDIATE MEDICAL ATTENTION.

INHALATION:
IF VAPORS, MISTS, OR SPRAYS OF THIS PRODUCT ARE INHALED, REMOVE VICTIM TO FRESH AIR. IF NECESSARY, USE ARTIFICIAL RESPIRATION TO SUPPORT VITAL FUNCTIONS. REMOVE OR COVER GROSS CONTAMINATION TO AVOID EXPOSURE TO RESCUERS.

INGESTION:
IF THIS PRODUCT IS SWALLOWED, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. IF PROFESSIONAL ADVICE IS NOT AVAILABLE, DO NOT INDUCE VOMITING. THE CONTAMINATED INDIVIDUAL SHOULD DRINK MILK, EGG WHITES, OR LARGE QUANTITIES OF WATER. NEVER INDUCE VOMITING OR GIVE DILUENTS (MILK OR WATER) TO SOMEONE WHO IS UNCONSCIOUS, HAVING CONVULSIONS, OR UNABLE TO SWALLOW.

THE CONTAMINATED INDIVIDUAL MUST BE TAKEN FOR MEDICAL ATTENTION, ESPECIALLY IF ANY ADVERSE EFFECT OCCURS. RESCUERS SHOULD BE TAKEN FOR MEDICAL ATTENTION, IF NECESSARY. TAKE A COPY OF LABEL AND MSDS TO HEALTH PROFESSIONAL WITH VICTIM.

5. FIRE-FIGHTING MEASURES

NFPA RATING:
HEALTH 2
FLAMMABILITY 3
REACTIVITY 1
OTHER

SEE ORIGINAL MSDS FOR DEFINITION OF RATINGS

THE FOLLOWING INFORMATION IS VARIABLE, DEPENDING ON THE BLEND. THE FOLLOWING INFORMATION IS FOR THE MAIN SOLVENTS COMPONENT OF THIS PRODUCT.

FLASH POINT:
ACETONE: -20 DEG. C (-4 DEG. F)
METHYL ETHYL KETONE: -9 DEG. C (16 DEG. F)

AUTOIGNITION TEMPERATURE:
ACETONE: 465 DEG. C (869 DEG. F)
METHYL ETHYL KETONE: 404 DEG. C (759 DEG. F)

FLAMMABLE LIMITS (IN AIR BY VOLUME):

ACETONE:
LOWER (LEL): 2.6%
UPPER (UEL): 12.8%

METHYL ETHYL KETONE:
LOWER (LEL): 1.8%
UPPER (UEL): 10.0%

THE FOLLOWING INFORMATION IS FOR THE PRODUCT.

FIRE EXTINGUISHING MATERIALS:
WATER SPRAY: YES (FOR COOLING ONLY)
CARBON DIOXIDE: YES
FOAM: YES
DRY CHEMICAL: YES
HALON: YES
OTHER: ANY "B" CLASS.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
THIS IS A CLASS I-B FLAMMABLE LIQUID. WHEN INVOLVED IN A FIRE, THIS MATERIAL MAY IGNITE AND PRODUCE IRRITATING VAPORS AND TOXIC GASES (E.G., CARBON MONOXIDE, CARBON DIOXIDE). THIS MATERIAL WILL READILY IGNITE AT ROOM TEMPERATURE. THE VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL TO A SOURCE OF IGNITION, AND FLASH BACK TO A LEAK OR OPEN CONTAINER. TETRAHYDROFURAN CAN FORM POTENTIALLY EXPLOSIVE PEROXIDES; CLOSED CONTAINERS CONTAMINATED WITH PEROXIDES CAN RUPTURE VIOLENTLY IN THE HEAT OF A FIRE.

EXPLOSION SENSITIVITY TO MECHANICAL IMPACT: NOT SENSITIVE.

EXPLOSION SENSITIVITY TO STATIC DISCHARGE:
THE VAPORS OF THIS PRODUCT CAN BE IGNITED BY STATIC ELECTRICAL ENERGY.

SPECIAL FIRE-FIGHTING PROCEDURES:
INCIPIENT FIRE RESPONDERS SHOULD WEAR EYE PROTECTION. STRUCTURAL FIREFIGHTERS MUST WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE EQUIPMENT. IF IT IS SAFE TO DO SO, ALLOW SMALL FIRES INVOLVING THIS PRODUCT TO BURN-OUT, WHILE PROTECTING EXPOSURES. IF POSSIBLE, PREVENT RUNOFF WATER FROM ENTERING STORM DRAINS, BODIES OF WATER, OR OTHER ENVIRONMENTALLY SENSITIVE AREAS. IF NECESSARY, RINSE CONTAMINATED EQUIPMENT THOROUGHLY BEFORE RETURNING SUCH EQUIPMENT TO SERVICE.

6. ACCIDENTAL RELEASE MEASURES

RELEASE RESPONSE:
IN CASE OF A SPILL, CLEAR THE AFFECTED AREA AND PROTECT PEOPLE. UNCONTROLLED RELEASES SHOULD BE RESPONDED TO BY TRAINED PERSONNEL USING PRE-PLANNED PROCEDURES. PROPER PROTECTIVE EQUIPMENT SHOULD BE USED. SMALL RELEASES (E.G., 1-PINT) MUST BE CLEANED-UP BY PERSONNEL WEARING GLOVES, GOGGLES, AND APPROPRIATE EYE PROTECTION. FACE SHIELDS MUST BE WORN IF SPLASHES OR SPRAYS OF THIS PRODUCT MAY BE GENERATED. IN THE EVENT OF A NON-INCIDENTAL RELEASE (E.G., FIVE, 1-GALLON CONTAINERS LEAKING SIMULTANEOUSLY IN A POORLY-VENTILATED AREA), THE MINIMUM PERSONAL PROTECTIVE EQUIPMENT SHOULD BE LEVEL B: TRIPLE-GLOVES (RUBBER GLOVES AND NITRILE GLOVES, OVER LATEX GLOVES), CHEMICALLY RESISTANT SUIT AND BOOTS, HART-HAT, AND SELF-CONTAINED BREATHING APPARATUS. LEVEL B SHOULD ALWAYS BE USED DURING RESPONSES IN WHICH THE OXYGEN LEVEL IS BELOW 19.5% OR UNKNOWN.

ELIMINATE ALL SOURCES OF IGNITION BEFORE SPILL CLEAN-UP BEGINS. USE NON-SPARKING TOOLS. ABSORB SPILLED LIQUID WITH ACTIVATED CARBON, POLYPADS OR OTHER SUITABLE ABSORBENT MATERIALS. MONITOR THE AREA FOR COMBUSTIBLE VAPORS AND THE LEVEL OF OXYGEN. MONITORING MUST INDICATE LESS THAN 10% OF THE LEL (SEE SECTION 5, FIRE-FIGHTING MEASURES) AND GREATER THAN 19.5% OXYGEN IS IN THE ATMOSPHERE BEFORE PERSONNEL ARE PERMITTED IN THE AREA WITHOUT LEVEL B PROTECTION. PLACE ALL SPILL RESIDUE IN AN APPROPRIATE CONTAINER AND SEAL. DISPOSE OF IN ACCORDANCE WITH U.S. FEDERAL, STATE, OR LOCAL PROCEDURES, THE APPLICABLE STANDARDS OF CANADA AND ITS PROVINCES, OR THE APPROPRIATE REQUIREMENTS OF EUROPEAN COMMUNITY MEMBER STATES (SEE SECTION 13, DISPOSAL CONSIDERATIONS).

PART III: HOW CAN I PREVENT HAZARDOUS SITUATIONS FROM OCCURRING?

7. HANDLING AND STORAGE

WORK PRACTICES AND HYGIENE PRACTICES:
AS WITH ALL CHEMICALS, AVOID GETTING THIS PRODUCT ON YOU OR IN YOU. WASH THOROUGHLY AFTER HANDLING THIS PRODUCT. DO NOT EAT, DRINK, SMOKE, OR APPLY COSMETICS WHILE HANDLING THIS PRODUCT. AVOID BREATHING VAPORS OR MISTS GENERATED BY THIS PRODUCT. USE IN A WELL-VENTILATED LOCATION. REMOVE CONTAMINATED CLOTHING IMMEDIATELY.

STORAGE AND HANDLING PRACTICES:
ALL EMPLOYEES WHO HANDLE THIS MATERIAL SHOULD BE TRAINED TO HANDLE IT SAFELY. CONTAINERS OF THIS PRODUCT MUST BE PROPERLY LABELED. IF THIS MIXTURE IS USED IN OTHER TYPES OF CONTAINERS, ONLY USE PORTABLE CONTAINERS APPROVED FOR FLAMMABLE LIQUIDS. POST "NO SMOKING" SIGNS, WHERE APPROPRIATE IN STORAGE AND USE AREAS. USE NON-SPARKING TOOLS. BOND AND GROUND DURING TRANSFER OF MATERIAL. STORE CONTAINERS OF THE PRODUCT IN A COOL, DRY LOCATION, AWAY FROM DIRECT SUNLIGHT, SOURCES OF INTENSE HEAT, OR WHERE FREEZING IS POSSIBLE. MATERIAL SHOULD BE STORED IN SECONDARY CONTAINERS, OR IN A DIKED AREA, AS APPROPRIATE. STORE CONTAINERS AWAY FROM INCOMPATIBLE CHEMICALS. KEEP CONTAINER TIGHTLY CLOSED WHEN NOT IN USE. STORAGE AREAS SHOULD BE MADE OF FIRE-RESISTANT MATERIALS. INSPECT ALL INCOMING CONTAINERS BEFORE STORAGE, TO ENSURE CONTAINERS ARE PROPERLY LABELED AND NOT DAMAGED. REFER TO NFPA 30, FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE FOR ADDITIONAL INFORMATION ON STORAGE. EMPTY CONTAINERS MAY CONTAIN RESIDUAL FLAMMABLE LIQUID OR VAPORS. THEREFORE, EMPTY CONTAINERS SHOULD BE HANDLED WITH CARE. DO NOT EXPOSE "EMPTY" CONTAINERS TO WELDING TOUCHES, OR ANY OTHER SOURCE OF IGNITION.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT:
FOLLOW PRACTICES INDICATED IN SECTION 6 (ACCIDENTAL RELEASE MEASURES). MAKE CERTAIN THAT APPLICATION EQUIPMENT IS LOCKED AND TAGGED-OUT SAFELY, IF NECESSARY. COLLECT ALL RINSATES AND DISPOSE OF ACCORDING TO APPLICABLE U.S. FEDERAL, STATE, OR LOCAL PROCEDURES, THE APPLICABLE STANDARDS OF CANADA AND ITS PROVINCES, OR THE APPROPRIATE REQUIREMENTS OF EUROPEAN COMMUNITY MEMBER STATES.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS:
USE WITH ADEQUATE VENTILATION. MECHANICAL EXHAUST MAY BE NEEDED. EMERGENCY EYE-WASH/SAFETY SHOWERS:
WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE-WASH FOUNTAIN/SAFETY SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

RESPIRATORY PROTECTION:
RESPIRATORY PROTECTION IS NOT GENERALLY NEEDED WHEN USING THIS PRODUCT. MAINTAIN AIRBORNE CONTAMINANT CONCENTRATIONS BELOW GUIDELINES LISTED IN SECTION 2 (COMPOSITION, INFORMATION ON INGREDIENTS). IF RESPIRATORY PROTECTION IS NEEDED, USE ONLY PROTECTION AUTHORIZED IN 29 CFR 1910.134 OR APPLICABLE STATE REGULATIONS. USE SUPPLIED AIR RESPIRATION PROTECTION IF OXYGEN LEVELS ARE BELOW 19.5% OR ARE UNKNOWN. RESPIRATORY PROTECTION GUIDELINES FOR ACETONE AND METHYL ETHYL KETONE (COMPONENTS OF THIS PRODUCT) ARE PROVIDED AS FOLLOWS.

NIOSH/OSHA RECOMMENDATIONS FOR ACETONE CONCENTRATIONS IN AIR:

UP TO 2500 PPM:
SAR OPERATED IN A CONTINUOUS-FLOW MODE; OR POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S); OR FULL-PIECE CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S); OR GAS MASK WITH ORGANIC VAPOR CANISTER; OR FULL-FACEPIECE SCBA; OR FULL-FACEPIECE SAR.

EMERGENCY OR PLANNED ENTRY INTO UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS:
POSITIVE PRESSURE, FULL-FACEPIECE SCBA; OR POSITIVE PRESSURE, FULL-FACEPIECE SAR WITH AN AUXILIARY POSITIVE PRESSURE SCBA.

ESCAPE: GAS MASK WITH ORGANIC VAPOR CANISTER; OR ESCAPE-TYPE SCBA.

NOTE:
THE IDLH CONCENTRATION FOR ACETONE IS 2,500 PPM (10% OF THE LOWER EXPLOSIVE LIMIT). THIS VALUE IS BASED ON THE LOWER EXPLOSIVE LIMIT (LEL). RESPIRATORY PROTECTION EQUIPMENT MAY NOT BE ADEQUATE FOR FIRE SITUATIONS.

NIOSH RECOMMENDATIONS FOR METHYL ETHYL KETONE CONCENTRATIONS IN AIR:

UP TO 3000 PPM:
SAR OPERATED IN A CONTINUOUS-FLOW MODE; OR POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S); OR FULL-PIECE CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S); OR GAS MASK WITH ORGANIC VAPOR CANISTER; OR FULL-FACEPIECE SCBA; OR FULL-FACEPIECE SAR.

EMERGENCY OR PLANNED ENTRY INTO UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS:
POSITIVE PRESSURE, FULL-FACEPIECE SCBA; OR POSITIVE PRESSURE, FULL-FACEPIECE SAR WITH AN AUXILIARY POSITIVE PRESSURE SCBA.

ESCAPE: GAS MASK WITH ORGANIC VAPOR CANISTER; OR ESCAPE-TYPE SCBA.

NOTE: THE IDLH CONCENTRATION FOR METHYL ETHYL KETONE IS 3000 PPM.

EYE PROTECTION:
SPLASH GOGGLES OR SAFETY GLASSES. FACE SHIELD SHOULD BE WORN WHEN WORKING IN SITUATIONS IN WHICH SPLASHES OR SPRAYS CAN BE GENERATED.

HAND PROTECTION:
WEAR GLOVES FOR ROUTINE INDUSTRIAL USE TO PROTECT HANDS FROM CONTACT. FOR LONG EXPOSURES, OR UNUSUAL CONTACT, SUCH AS SPILL CLEANUP, CHEMICAL RESISTANT GLOVES MAY BE REQUIRED. SEE SECTION 6.

BODY PROTECTION:
USE BODY PROTECTION APPROPRIATE FOR TASK (E.G., APRON OR TYVEK SUIT).

9. PHYSICAL AND CHEMICAL PROPERTIES

RELATIVE VAPOR DENSITY (AIR = 1): >1

EVAPORATION RATE (nBuAc = 1): >1

SPECIFIC GRAVITY (WATER = 1): <1.0

FREEZING/MELTING POINT: NOT ESTABLISHED.

SOLUBILITY IN WATER @ 25 DEG. C: SOMEWHAT SOLUBLE.

BOILING POINT: NOT ESTABLISHED.

VAPOR PRESSURE, MMHg @ 20 DEG. C: NOT ESTABLISHED.

pH: NOT ESTABLISHED.

ODOR THRESHOLD: NOT ESTABLISHED.

COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT):
NOT ESTABLISHED.

ODOR THRESHOLD: NOT ESTABLISHED.

FORM: LIQUID.

COLOR: CLEAR, PURPLE OR BLUE

ODOR: ETHEREAL.

VISCOSITY: WATER-LIKE.

FLASH POINT:
ACETONE: -9 DEG. C (15 DEG. F)
METHYL ETHYL KETONE: -9 DEG. C (15 DEG. F)

HOW TO DETECT THIS SUBSTANCE (WARNING PROPERTIES):
THE COLOR AND ODOR OF THE PRODUCT MAY BE DISTINCTIVE PROPERTIES OF THIS PRODUCT.

10. STABILITY AND REACTIVITY

STABILITY: STABLE.

NOTE:
TETRAHYDROFURAN, A COMPONENT OF THIS PRODUCT, CAN FORM POTENTIALLY EXPLOSIVE PEROXIDE COMPOUNDS WHEN EXPOSED TO LIGHT OR AIR. THOUGH THIS PRODUCT CONTAINS INHIBITORS TO PREVENT PEROXIDE FORMATION, CARE SHOULD BE USED WHEN STORING THIS PRODUCT, OR HANDLING OLD CONTAINERS OF THIS MATERIAL.

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE:
THIS PRODUCT WILL NOT BE COMPATIBLE WITH STRONG OXIDIZERS, LITHIUM ALUMINUM HYDRIDE, AND ALKALINE EARTH HYDROXIDES.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR.

CONDITIONS TO AVOID:
AVOID EXPOSURE OR CONTACT TO EXTREME TEMPERATURES, SOURCES OF IGNITION, INCOMPATIBLE CHEMICALS.

PART IV: IS THERE ANY OTHER USEFUL INFORMATION ABOUT THIS MATERIAL?

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA:
THE SPECIFIC TOXICOLOGY DATA AVAILABLE FOR COMPONENTS GREATER THAN 1% IN CONCENTRATION ARE AS FOLLOWS.

ACETONE:

EYE IRRITANCY (HUMAN): 500 PPM

SKIN IRRITANCY (RABBIT): 395 MG/OPEN; MILD

SKIN IRRITANCY (RABBIT): 500 MG/24 HOURS; MILD

EYE IRRITANCY (RABBIT): 3950 (MICRO)G; SEVERE

EYE IRRITANCY (RABBIT): 20 MG/24 HOURS; MODERATE

CYTOGENETIC ANALYSIS (SACCHAROMYCES CEREVISIAE): 200 MMOL/TUBE

SEX CHROMOSOME LOSS AND NONDISJUNCTION (SACCHAROMYCES CEREVISIAE): 47,600 PPM

TDLO (INHALATION, MAN): 440 (MICRO)G/M3/6 MONTHS

TDLO (INHALATION, MAN): 10 MG/M3/6 HOURS

TCLO (INHALATION, HUMAN): 500 PPM; EYE EFFECTS

TCLO (INHALATION, MAN): 12,000 PPM/4 HOURS; GASTROINTESTINAL TRACT EFFECTS

LD50 (INTRAVENOUS, RAT): 5500 MG/KG

LD50 (ORAL, RAT): 5800 MG/KG

LC50 (INHALATION, RAT): 50,100 MG/M3/8 HOURS

LDLO (INTRAPERITONEAL, RAT): 500 MG/KG

LD50 (INTRAVENOUS, RAT): 5500 MG/KG

LD50 (ORAL, MOUSE): 3000 MG/KG

LCLO (INHALATION, MOUSE): 110 G/M3/1 HOUR

LD50 (INTRAPERITONEAL, MOUSE): 1297 MG/KG

LDLO (INTRAVENOUS, MOUSE): 4 G/KG

LDLO (ORAL, DOG): 8 G/KG

LD50 (ORAL, RABBIT): 5340 MG/KG

LD50 (SKIN, RABBIT): 20 G/KG

TDLO - ORAL - RAT: 273 GM/KG
MALE 13 WEEK(S) PRE-MATING: REPRODUCTIVE - PATERNAL EFFECTS-SPERMATOGENESIS

TCLO - INHALATION:
MAMMAL - SPECIES UNSPECIFIED:
31500 (MICRO)G/M3/24H; FEMALE 1-13 DAY(S) AFTER CONCEPTION

SEX CHROMOSOME LOSS AND NONDISJUNCTION:
YEASL-SACCHAROMYCES CEREVISIAE: 47600 PPM

CYTOGENETIC ANALYSIS:
RODENT - HAMSTER FIBROBLAST: 40 GM/L

CYCLOHEXANONE:

EYE EFFECTS-HUMAN: 75 PPM

SKIN-RABBIT, ADULT: 500 MG OPEN MILD IRRITATION EFFECTS

EYE EFFECTS-RABBIT, ADULT: 4740 (MICRO)G SEVERE IRRITATION EFFECTS

MICROSOMAL MUTAGENICITY ASSAY-SALMONELLA TYPHIMURIUM: 20 (MICRO)L/L

MUTATION IN MICROORGANISMS-BACILLUS SUBTILIS: 200 (MICRO)L/L

SISTER CHROMATID EXCHANGE-HAMSTER: OVARY 7500 (MICRO)L/L

ORAL-MOUSE TDLO: 11 G/KG (FEMALE 8-12D POST); REPRODUCTIVE EFFECTS

INHALATION-HUMAN TCLO: 75 PPM; NOSE, EYE EFFECTS, PULMONARY SYSTEM EFFECTS

ORAL-RAT LD50: 1535 MG/KG

INHALATION-RAT LC50: 8000 PPM/4 HOURS

SUBCUTANEOUS-RAT LD50: 2170 MG/KG

ORAL-MOUSE LD50: 1400 MG/KG

INTRAPERITONEAL-MOUSE LD50: 1350 MG/KG

SUBCUTANEOUS-MOUSE LDLO: 1300 MG/KG

INTRAVENOUS-DOG, ADULT LDLO: 630 MG/KG

ORAL-RABBIT, ADULT LDLO: 1600 MG/KG

SKIN-RABBIT, ADULT LD50: 948 MG/KG

TCLO - INHALATION - RAT: 105 MG/M3/4 HOURS
FEMALE 1-20 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - FERTILITY - PRE-IMPLANTATION MORTALITY

TDLO - ORAL - MOUSE: 11 GM/KG
FEMALE 8-12 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE-EFFECTS ON NEWBORN - GROWTH STATISTICS (E.G.%, REDUCED WEIGHT GAIN)

MUTATION IN MICROORGANISMS:
BACTERIA - SALMONELLA TYPHIMURIUM: 20 (MICRO)L/

MUTATION IN MICRO ORGANISMS - BACTERIA - BACILLUS SUBTILIS:
200 (MICRO)L/L.

CYTOGENETIC ANALYSIS:
HUMAN LEUKOCYTE: 100 (MICRO)MOL/L

CYTOGENETIC ANALYSIS:
HUMAN LYMPHOCYTE: 5 (MICRO)G/L

SISTER CHROMATID EXCHANGE:
RODENT - HAMSTER OVARY: 7500 (MICRO)L/L

MUTATION IN MAMMALIAN SOMATIC:
RODENT - HAMSTER OVARY: 7500 (MICRO)L/L

METHYL ETHYL KETONE:

EYE EFFECTS-HUMAN: 350 PPM

SKIN-RABBIT, ADULT: 500 MG/24 HOURS; MODERATE IRRITATION EFFECTS

SKIN-RABBIT, ADULT: 402 MG/24 HOURS; MILD IRRITATION EFFECTS

SKIN-RABBIT, ADULT: 13,780 MG/24 H OPEN MILD IRRITATION EFFECTS

EYE EFFECTS-RABBIT, ADULT: 80 MG

SEX CHROMOSOME LOSS AND NONDISJUNCTION-SACCHAROMYCES CEREVISALE:
33,800 PPM

INHALATION-RAT TCLO: 1000 PPM/(6-15D PREG); TERATOGENIC EFFECTS

INHALATION-HUMAN TCLO: 100 PPM/5 MINUTES; IRRITANT EFFECTS

ORAL-RAT LD50: 2737 MG/KG

INHALATION-RAT LC50: 23,500 MG/M3/8 HOURS

INTRAPERITONEAL-RAT LD50: 607 MG/KG

ORAL-MOUSE LD50: 4050 MG/KG

INHALATION-MOUSE LC50: 40 G/M3/2 HOURS

INTRAPERITONEAL-MOUSE LD50: 616 MG/KG

SKIN-RABBIT, ADULT LD50: 6450 MG/KG

INTRAPERITONEAL-GUINEA PIG, ADULT LDLO: 2 G/KG

INHALATION-UNSPECIFIED EFFECTS LC50: 38 G/M3

INHALATION-RAT TCLO: 5000 PPM/6H/90 DAYS-INTERMITTENT

TDLO - SUBCUTANEOUS - CAT:
55500 MG/KG/37 WEEKS - INTERMITTENT; REPRODUCTIVE - TUMORIGENIC EFFECTS - OTHER REPRODUCTIVE SYSTEM TUMORS

TCLO - INHALATION - RAT: 3000 PPM/7 HOURS
FEMALE 6-15 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - SPECIFIC DEVELOPMENTAL ABNORMALITIES - CRANIOFACIAL (INCLUDING NOSE AND TONGUE), UROGENITAL SYSTEM, HOMEOSTASIS

TCLO - INHALATION - RAT: 1000 PPM/7 HOURS
FEMALE 6-15 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - EFFECTS ON EMBRYO OR FETUS - FETOTOXICITY (EXCEPT DEATH, E.G., STUNTED FETUS) REPRODUCTIVE - SPECIFIC DEVELOPMENTAL ABNORMALITIES - MUSCULOSKELETAL SYSTEM

TCLO - INHALATION - MOUSE: 3000 PPM/7H
FEMALE 6-15 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - EFFECTS ON EMBRYO OR FETUS - FETOTOXICITY

TETRAHYDROFURAN:

MUTATION IN MICROORGANISMS-ESCHERICHIA COLI: 1 (MICRO)MOL/L

INHALATION-HUMAN TCLO: 25,000 PPM; CENTRAL NERVOUS SYSTEM EFFECTS

ORAL-RAT LD50: 1650 MG/KG.

INHALATION-RAT LC50: 21,000 PPM/3H

INTRAPERITONEAL-RAT LD50: 2900 MG/KG

INHALATION-MOUSE LCLO: 24,000 MG/M3/2 HOURS

INTRAPERITONEAL-MOUSE LD50: 1900 MG/KG

INTRAPERITONEAL-GUINEA PIG, ADULT LDLO: 500 MG/KG

INHALATION-RAT TCLO: 5000 PPM/6 HOURS/91 DAYS-INTERMITTENT

TCLO - INHALATION - RAT: 5000 PPM/6H
FEMALE 6-19 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - EFFECTS ON EMBRYO OR FETUS - FETOTOXICITY

TCLO - INHALATION - MOUSE: 1800 PPM/6H
FEMALE 6-17 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - FERTILITY - POST - IMPLANTATION MORTALITY

MUTATION IN MICROORGANISMS:
BACTERIA - ESCHERICHIA COLI: 1 (MICRO)MOL/L

SUSPECTED CANCER AGENT:
COMPONENTS OF THIS PRODUCTS ARE LISTED AS FOLLOWS:

ACETONE:
EPA-D: NOT CLASSIFIABLE AS TO HUMAN CARCINOGENICITY.

METHYL ETHYL KETONE:
EPA-D: NOT CLASSIFIABLE AS TO HUMAN CARCINOGENICITY.

CYCLOHEXANONE:
IARC-3: NOT CLASSIFIABLE AS A HUMAN CARCINOGEN.
MAK-B: JUSTIFIABLY SUSPECTED OF HAVING CARCINOGENIC POTENTIAL.

THIS PRODUCT'S COMPONENTS ARE NOT FOUND ON THE FOLLOWING LISTS: FEDERAL OSHA Z LIST, NTP, IARC, AND CAL/OSHA AND THEREFORE ARE NEITHER CONSIDERED TO BE NOR SUSPECTED TO BE CANCER-CAUSING AGENTS BY THESE AGENCIES.

IRRITANCY OF PRODUCT:
THIS PRODUCT IS EXPECTED TO MILDLY TO SEVERELY IRRITATE THE SKIN AND EYES.

SENSITIZATION TO THE PRODUCT:
NO COMPONENT OF THIS PRODUCT IS KNOWN TO BE A SENSITIZER WITH PROLONGED OR REPEATED USE.

REPRODUCTIVE TOXICITY INFORMATION:
LISTED BELOW IS INFORMATION CONCERNING THE EFFECTS OF THIS PRODUCT AND ITS COMPONENTS ON THE HUMAN REPRODUCTIVE SYSTEM.

MUTAGENICITY:
THIS PRODUCT IS NOT REPORTED TO PRODUCE MUTAGENIC EFFECTS IN HUMANS. HUMAN MUTATION DATA ARE AVAILABLE FOR CYCLOHEXANONE (A COMPONENT OF THIS PRODUCT); THESE DATA WERE OBTAINED ON SPECIFIC HUMAN TISSUES EXPOSED TO RELATIVELY HIGH DOSES. ANIMAL MUTATION DATA ARE AVAILABLE FOR ACETONE, METHYL ETHYL KETONE, AND TETRAHYDROFURAN (COMPONENTS OF THIS PRODUCT); THESE DATA WERE OBTAINED DURING CLINICAL STUDIES ON SPECIFIC ANIMAL TISSUES OR MICRO-ORGANISMS EXPOSED TO HIGH DOSES OF THESE COMPOUNDS.

EMBRYOTOXICITY:
THIS PRODUCT IS NOT REPORTED TO PRODUCE EMBRYOTOXIC EFFECTS IN HUMANS.

TERATOGENICITY:
THIS PRODUCT IS NOT REPORTED TO CAUSE TERATOGENIC EFFECTS IN HUMANS. THREE ANIMAL STUDIES INVOLVING METHYL ETHYL KETONE (A COMPONENT OF THIS PRODUCT) HAVE SHOWN FETOTOXICITY (SKELETAL ANOMALIES) AT DOSES WHICH DID NOT PRODUCE SIGNIFICANT MATERNAL TOXICITY.

REPRODUCTIVE TOXICITY:
THIS PRODUCT IS NOT REPORTED TO CAUSE REPRODUCTIVE EFFECTS IN HUMANS. REPRODUCTIVE TOXICITY DATA ARE AVAILABLE FOR ACETONE, METHYL ETHYL KETONE AND TETRAHYDROFURAN (A COMPONENT OF THIS PRODUCT); THESE DATA WERE OBTAINED FROM CLINICAL STUDIES ON TEST ANIMALS EXPOSED TO RELATIVELY HIGH DOSES.

A MUTAGEN IS A CHEMICAL WHICH CAUSES PERMANENT CHANGES TO GENETIC MATERIAL (DNA) SUCH THAT THE CHANGES WILL PROPAGATE THROUGH GENERATIONAL LINES.

AN EMBRYOTOXIN IS A CHEMICAL WHICH CAUSES DAMAGE TO A DEVELOPING EMBRYO (I.E. WITHIN THE FIRST EIGHT WEEKS OF PREGNANCY IN HUMANS), BUT THE DAMAGE DOES NOT PROPAGATE ACROSS GENERATIONAL LINES.

A TERATOGEN IS A CHEMICAL WHICH CAUSES DAMAGE TO A DEVELOPING FETUS, BUT THE DAMAGE DOES NOT PROPAGATE ACROSS GENERATIONAL LINES.

A REPRODUCTIVE TOXIN IS ANY SUBSTANCE WHICH INTERFERES IN ANY WAY WITH THE REPRODUCTIVE PROCESS.

ACGIH BIOLOGICAL EXPOSURE INDICES:
CURRENTLY, THERE ARE ACGIH BIOLOGICAL EXPOSURE INDICES (BEIS) ASSOCIATED WITH COMPONENTS OF THIS PRODUCT, AS FOLLOWS:

CHEMICAL DETERMINANT	SAMPLING TIME	BEI
ACETONE:		
ACETONE IN URINE	END OF SHIFT	100 MG/L
METHYL ETHYL KETONE (MEK):		
MEK IN URINE	END OF SHIFT	2 MG/L
TETRAHYDROFURAN (INTENDED):		
TETRAHYDROFURAN IN URINE	END OF SHIFT	8 MG/L

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:
PREEXISTING RESPIRATORY PROBLEMS, DERMATITIS, AND OTHER SKIN DISORDERS, AS WELL AS CONDITIONS INVOLVING THE "TARGET ORGANS" (SEE SECTION 3, HAZARD IDENTIFICATION) CAN BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT.

RECOMMENDATIONS TO PHYSICIANS:
TREAT SYMPTOMS AND ELIMINATE OVEREXPOSURE. IF NECESSARY, REVIEW FOR BRAIN AND CENTRAL NERVOUS SYSTEM EFFECTS AND CONDUCT PULMONARY FUNCTION TEST. OTHER TESTS FOR LUNG, KIDNEY, AND LIVER EFFECTS MAY ALSO PROVE USEFUL.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY:
THE COMPONENTS OF THIS PRODUCT WILL BIODEGRADE INTO OTHER ORGANIC COMPOUNDS.
ENVIRONMENTAL DATA ARE AVAILABLE FOR COMPONENTS OF THIS PRODUCT, AS FOLLOWS:

ACETONE:

LOG KOW: -0.24.

WATER SOLUBILITY:
MISCIBLE. ACETONE IS QUITE READILY DEGRADED IN THE ENVIRONMENT.

BOD:
122%
5 DAYS.
THE POTENTIAL FOR BIOCONCENTRATION IN FISH IS NEGLIGIBLE. ONE EXPERIMENTAL STUDY OF BIOCONCENTRATION IN ADULT HADDOCK AT 7-9 DEG. C (STATIC TEST) RESULTED IN A BCF OF 0.69.

CYCLOHEXANONE:
KOC: 0.81.
WATER SOLUBILITY: 23,000 MG/L.
CYCLOHEXANONE IS NOT RAPIDLY VOLATILIZED FROM WATER, EXCEPT FOR FAST MOVING STREAMS OR VERY SHALLOW PONDS. SIGNIFICANT SOIL LEACHING OCCURS, CONTRIBUTING TO GROUND WATER CONTAMINATION. BIODEGRADATION AND PHOTOLYSIS OCCUR IN WATER. RAPID ATMOSPHERIC DEGRADATION OCCURS VIA PHOTOLYSIS, WITH A HALF-LIFE OF ABOUT 1 TO 5 DAYS.

METHYL ETHYL KETONE:
LOG KOW: 0.29.
WATER SOLUBILITY: 239,000 MG/L.
METHYL ETHYL KETONE IS RAPIDLY VOLATILIZED FROM WATER AND UNDERGOES SLOW BIODEGRADATION. IT UNDERGOES MODERATE ATMOSPHERIC PHOTODEGRADATION.

TETRAHYDROFURAN:
WATER SOLUBILITY: 30% (25 DEG. C).
TETRAHYDROFURAN IS SIGNIFICANTLY BIODEGRADED IN STANDARD TESTS. THIS COMPOUND IS NOT EXPECTED TO BIOCONCENTRATE IN FISH SIGNIFICANTLY.

EFFECT OF MATERIAL ON PLANTS OR ANIMALS:
THIS PRODUCT CAN BE HARMFUL OR FATAL TO CONTAMINATED PLANT OR ANIMAL LIFE, ESPECIALLY IF RELEASED IN LARGE QUANTITIES INTO THE ENVIRONMENT. REFER TO SECTION 11 (TOXICOLOGICAL INFORMATION) FOR INFORMATION REGARDING THE EFFECT OF THIS PRODUCT'S COMPONENTS ON TEST ANIMALS.

EFFECT OF CHEMICAL ON AQUATIC LIFE:
THIS PRODUCT CAN BE HARMFUL OR FATAL TO CONTAMINATED AQUATIC PLANT OR ANIMAL LIFE, ESPECIALLY IF RELEASED IN LARGE QUANTITY IN A BODY OF WATER. THE FOLLOWING LISTS AQUATIC TOXICITY DATA ARE AVAILABLE FOR THE COMPONENTS OF THIS PRODUCT:

ACETONE:

LC50 (JAPANESE QUAIL):
40,000 PPM, IN DIET, AGE 14 DAYS, (NO MORTALITY TO 40,000 PPM)

LC50 (RING-NECKED PHEASANT):
40,000 PPM, IN DIET, AGE 10 DAYS, (NO MORTALITY TO 40,000 PPM)

LD50 (SALMO GAIRDENERI, RAINBOW TROUT):
5,540 MG/L/86 HOURS/12 DEG. C
(95% CONFIDENCE LIMIT 4,740-6,330 MG/L), WT 1.0 G (STATIC BIOASSAY)

LC50, F (FINGERLING TROUT): 6,100 MG/L/24 HOURS

LD100 (ASEILUS AQUATICUS):
3 ML/L/WITHIN 3 DAYS; (WITHIN 3 DAYS OF EXPOSURE) (CONDITIONS OF BIOASSAY NOT SPECIFIED)

LD100 (GAMARUS FOSSARUM):
10 ML/L/WITHIN 48 HOURS; (CONDITIONS OF BIOASSAY NOT SPECIFIED)

LC50 (PIMEPHALEUS PROMELAS):
8,120 MG/L/96 HOURS, (CONDITIONS OF BIOASSAY NOT SPECIFIED)

TLM (DAPHNIA MAGNA):
10 MG/L/24 AND 48 HOURS, (CONDITIONS OF BIOASSAY NOT SPECIFIED)

TLM (BRINE SHRIMP):
2100 MG/L 24 AND 48 HOURS, (CONDITIONS OF BIOASSAY NOT SPECIFIED)

TLM (MOSQUITO FISH):
13000 MG/L/24, 48 AND 96 HOURS, (CONDITIONS OF BIOASSAY NOT SPECIFIED)

LC50 (LEPOMIS MACROCHIRUS, BLUEGILL SUNFISH):
8300 MG/L 96 HOURS, (CONDITIONS OF BIOASSAY NOT SPECIFIED)

LD50 (GOLDFISH): 5000 MG/L/24 HOURS, (CONDITIONS OF BIOASSAY NOT SPECIFIED)

LC50 (POECILIA RETICULATA, GUPPY):
7,032 PPM/14 DAYS, (CONDITIONS OF BIOASSAY NOT SPECIFIED)

LC50 (MEXICAN AXOLOTL):
20.0 MG/L/48 HOURS/3-4 WEEKS AFTER HATCHING, (CONDITIONS OF BIOASSAY NOT SPECIFIED)

LC50 (CLAWED LOAD):

24.0 MG/L/48 HOURS/3-4 WEEKS AFTER HATCHING, (CONDITIONS OF BIOASSAY NOT SPECIFIED)

CYCLOHEXANONE:

LC50 (PIMEPHALES PROMELAS FATHEAD MINNOW): 527 MG/L 96 HOURS

EC0 (BACTERIA PSEUDOMONAS PUTIDA) 16 HOURS: 180 MG/L

EC0 (ALGAE MICROCYSTIS AERUGINOSA) 8 DAYS: 52 MG/L

EC0 (GREEN ALGAE SCENEDESMUS QUADRICAUDA) 7 DAYS: 370 MG/L

EC0 (PROTOZOA ENTOSIPHON SULCATUM) 72 HOURS: 545 MG/L

EC0 (PROTOZOA URONEMA PARDUCZI CHATTON-LWOFF): 280 MG/L

EC0 (BACTERIA PSEUDOMONAS FLUORESCENTS) 16 HOURS:
180 MG/L (pH = EC0 (CHILOMONAS PARAMECIUM EHRENBERG) 48 HOURS: 573 MG/L

EC0 (DAPHNIA MAGNA STRAUS) 24 HOURS: 526 MG/L

EC50 (DAPHNIA MAGNA STRAUS) 24 HOURS: 820 MG/L

EC100 (DAPHNIA MAGNA STRAUS) 24 HOURS: 1,240 MG/L

EC0 (DAPHNIA MAGNA) 24 HOURS: 540 MG/L

EC50 (DAPHNIA MAGNA) 24 HOURS: 800 MG/L

EC100 (DAPHNIA MAGNA) 24 HOURS: 1,540 MG/L

LC50 (FATHEAD MINNOW) 96 HOURS: 526; 618; 630 MG/L

LC50 (LEUCISCUS IDUS) 24 HOURS: 538 MG/L

LC50 (LEUCISCUS IDUS) 96 HOURS: 536; 539; 752 MG/L

METHYL ETHYL KETONE:

EC0 (SCENEDESMUS QUADRICAUDA, GREEN ALGAE): 4300 MG/L/8 DAYS

EC0 (ENTOSIPHON SUFCALUM, PROTOZOA): 190 MG/L/72 HOURS

EC0 (URONEMA PARDUCZI CHATTON-LWOFF, PROTOZOA): 2830 MG/L

EC0 (PSEUDOMONAS PUTIDA, BACTERIA): 1150 MG/L/16 HOURS

LC50 (PIMEPHALES PROMELAS, FATHEAD MINNOW): 3200 MG/L/96 HOUR

LD0 (PSEUDOMONAS, BACTERIA): 2,500 MG/L

LD0 (SCENEDESMUS, ALGAE): 12,500 MG/L

LD0 (COLPODA, PROTOZOA): 5,000 MG/L

LC50 (MOSQUITO FISH): 5,600 MG/L/24-96 HOURS

LC50 (BLUEGILL): 5,640-1,690 MG/L/24-96 HOURS

LC50 (GOLDFISH): 5,000 MG/L/24 HOURS

TETRAHYDROFURAN:

GROWTH INHIBITION (MICROCYSTIS, BLUE ALGEA): 225 MG/L

TOXICITY THRESHOLD (CELL MULTIPLICATION INHIBIT SYSTEM TEST):
(URONEMA PARDUCZI CHATTON-LWOFF, PROTOZOA): 858 MG/L
(PSEUDOMONAS PUTIDA, BACTERIA): 580 MG/L
(MICROCYTIS AERUGINOSA, ALGEA): 225 MG/L

LC50 (SILVER/GOLDEN ORFE): 2820-2930 MG/L

LC50 (FATHEAD MINNOW): 2160 MG/L/96 HOURS

LC50 (CARP): 4400 MG/L/48 HOURS

LC50 (GOLDFISH): 2400 MG/L/48 HOURS

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL:
WASTE DISPOSAL MUST BE IN ACCORDANCE WITH APPROPRIATE U.S. FEDERAL, STATE, AND LOCAL REGULATIONS, THOSE OF CANADA AND ITS PROVINCES, AS WELL AS THOSE APPLICABLE TO THE EC MEMBER STATES. THIS PRODUCT, IF UNALTERED BY USE, MAY BE DISPOSED OF BY TREATMENT AT A PERMITTED FACILITY OR AS ADVISED BY YOUR LOCAL HAZARDOUS WASTE REGULATORY AUTHORITY.

U.S. EPA WASTE NUMBER: D001 (CHARACTERISTIC/IGNITABILITY)

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME:
FLAMMABLE LIQUID, N.O.S. (ACETONE, METHYL ETHYL KETONE)

HAZARD CLASS NUMBER AND DESCRIPTION: 3 (FLAMMABLE LIQUID)

UN IDENTIFICATION NUMBER: UN 1993

PACKING GROUP: II

DOT LABEL(S) REQUIRED: FLAMMABLE LIQUID

NOTE:
SHIPMENTS OF CONTAINERS HOLDING 1-LITER OR LESS IN VOLUME QUALIFY FOR A "LIMITED QUANTITY" EXCEPTION. REFER TO 49 CFR 173.150 FOR ADDITIONAL INFORMATION.

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER, 1996: 128

MARINE POLLUTANT:
NO COMPONENT OF THIS PRODUCT IS DESIGNATED AS A MARINE POLLUTANT BY THE DOT (PER 49 CFR 172.101, APPENDIX B).

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:

THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. USE THE ABOVE INFORMATION FOR THE PREPARATION OF CANADIAN SHIPMENTS.

IMO DESIGNATION:
THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS BY THE INTERNATIONAL MARITIME ORGANIZATION

PROPER SHIPPING NAME:
FLAMMABLE LIQUID, N.O.S. (ACETONE, METHYL ETHYL KETONE)

HAZARD CLASS NUMBER AND DESCRIPTION: 3.1 (FLAMMABLE LIQUID; LOW FLASH POINT)

UN IDENTIFICATION NUMBER: UN 1993

PACKING GROUP: II

LABEL(S) REQUIRED: FLAMMABLE LIQUID

IMDG CODE: 3126

MARINE POLLUTANT:
THIS PRODUCT IS NOT DESIGNATED BY THE IMO TO BE A MARINE POLLUTANT.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):
THIS MATERIAL IS CONSIDERED BY THE UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE TO BE DANGEROUS GOODS.

ADDITIONAL INFORMATION IS AS FOLLOWS:

SUBSTANCE IDENTIFICATION NO.: 1993

NAME OF SUBSTANCE: FLAMMABLE LIQUID, N.O.S.

HAZARD IDENTIFICATION NO. (DESCRIPTION): 33

LABEL: FLAMMABLE LIQUID

CLASS AND ITEM NUMBER: 3,1 (A), 2 (A), (B), 3 (B), 5 (C)

15. REGULATORY INFORMATION

ADDITIONAL UNITED STATES REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS:
THE COMPONENTS OF THIS PRODUCT ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTIONS 302, 304, AND 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT, AND ARE LISTED AS FOLLOWS:

CHEMICAL NAME	SARA 302 (40 CFR 355, APPENDIX A)	SARA 304 (40 CFR TABLE 302.4)	SARA 313 (40 CFR 372.65)
ACETONE	NO	YES	NO
CYCLOHEXANONE	NO	YES	YES
METHYL ETHYL KETONE	NO	YES	YES
TETRAHYDROFURAN	NO	YES	NO

U.S. SARA THRESHOLD PLANNING QUANTITY: NOT APPLICABLE.

U.S. CERCLA REPORTABLE QUANTITY (RQ):
ACETONE: 500 LB
CYCLOHEXANONE: 5000 LB.
METHYL ETHYL KETONE: 5000 LB.
TETRAHYDROFURAN: 1000 LB.

U.S. TSCA INVENTORY STATUS:
THE COMPONENTS OF THIS PRODUCT ARE LISTED ON THE TSCA INVENTORY.

OTHER U.S. FEDERAL REGULATIONS: NOT APPLICABLE.

U.S. STATE REGULATORY INFORMATION:
COMPONENTS OF THIS PRODUCT ARE COVERED UNDER SPECIFIC STATE REGULATIONS, AS DENOTED BELOW:

ALASKA - DESIGNATED TOXIC AND HAZARDOUS SUBSTANCES:
ACETONE, CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

CALIFORNIA - PERMISSIBLE EXPOSURE LIMITS FOR CHEMICAL CONTAMINANTS:
ACETONE, CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

FLORIDA - SUBSTANCE LIST:
ACETONE, CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

ILLINOIS - TOXIC SUBSTANCE LIST:
ACETONE, CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

KANSAS - SECTION 302/313 LIST:
ACETONE, CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

MASSACHUSETTS - SUBSTANCE LIST:
ACETONE, CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

MICHIGAN - CRITICAL MATERIALS REGISTER: NO.

MINNESOTA - LIST OF HAZARDOUS SUBSTANCES:
ACETONE, CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

MISSOURI - EMPLOYER INFORMATION/TOXIC SUBSTANCE LIST:
ACETONE, CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

NEW JERSEY - RIGHT TO KNOW HAZARDOUS SUBSTANCE LIST:
ACETONE, CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

NORTH DAKOTA - LIST OF HAZARDOUS CHEMICALS, REPORTABLE QUANTITIES:
ACETONE, CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

PENNSYLVANIA - HAZARDOUS SUBSTANCE LIST:
ACETONE, CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

RHODE ISLAND - HAZARDOUS SUBSTANCE LIST:
ACETONE, CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

TEXAS - HAZARDOUS SUBSTANCE LIST:
ACETONE, METHYL ETHYL KETONE, CYCLOHEXANONE, TETRAHYDROFURAN.

WEST VIRGINIA - HAZARDOUS SUBSTANCE LIST:
ACETONE, CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

WISCONSIN - TOXIC AND HAZARDOUS SUBSTANCES:
ACETONE, CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

CALIFORNIA, SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65):
THIS PRODUCT MAY CONTAIN TRACE CONSTITUENTS, SUCH AS VINYL CHLORIDE, PRESENT IN ONE OF THE PRODUCT'S COMPONENTS. UNDER COMMON USAGE, EXPOSURES TO THESE TRACE CONSTITUENTS AT LEVELS EXCEEDING THE "NO SIGNIFICANT RISK LEVEL" (NSRL) WOULD NOT OCCUR. USERS ARE EXPECTED TO FOLLOW NORMAL PPE AND VENTILATION GUIDELINES SUCH AS THOSE IN SECTION 8 AND OTHER PORTIONS OF THIS MSDS.

VOC INFORMATION:
THIS PRODUCT EMITS VOLATILE ORGANIC COMPOUNDS (VOC'S) DURING USE AND CURE. USERS SHOULD DETERMINE IF LOCAL REGULATIONS REGARDING USE OF VOC CONTAINING PRODUCTS EXIST IN THEIR AREA AND IF THIS PRODUCT COMPLIES.

ANSI STANDARD LABELING (Z129.1):

DANGER!
EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. MAY BE HARMFUL IF INHALED. MAY CAUSE CENTRAL NERVOUS SYSTEM EFFECTS. MAY CAUSE SKIN AND EYE IRRITATION.
ASPIRATION HAZARD - CAN CAUSE LIFE-THREATENING LUNG DAMAGE IF SWALLOWED. MAY CAUSE REPRODUCTIVE EFFECTS, BASED ON ANIMAL TESTS. KEEP AWAY FROM HEAT, SPARKS, AND FLAME. AVOID BREATHING VAPOR OR MISTS. AVOID CONTACT WITH SKIN OR CLOTHING. USE ONLY WITH ADEQUATE VENTILATION. KEEP CONTAINER CLOSED. WASH THOROUGHLY AFTER HANDLING. RECOMMENDED MAXIMUM SHELF-LIFE FOR UNOPENED CONTAINERS IS 2 YEARS.

FIRST AID:
IN CASE OF CONTACT, IMMEDIATELY FLUSH SKIN OR EYES FOR AT LEAST 15 MINUTES. IF INHALED, MOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF FIRE:
USE FOG, FOAM, DRY CHEMICAL OR CO2. LIQUID WILL FLOAT AND MAY RE-IGNITE ON THE SURFACE OF WATER.

IN CASE OF SPILL:
ABSORB SPILL WITH INERT MATERIAL (E.G. ACTIVATED CARBON) THEN PLACE IN SUITABLE CONTAINER. REFER TO MATERIAL SAFETY DATA SHEET FOR ADDITIONAL INFORMATION ON THIS PRODUCT.

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS:
THE COMPONENTS OF THIS PRODUCT ARE ON THE DSL INVENTORY.

OTHER CANADIAN REGULATIONS: NOT APPLICABLE.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LIST:
THE COMPONENTS OF THIS PRODUCT ARE NOT ON THE CEPA PRIORITIES SUBSTANCES LIST.

CANADIAN WHMIS SYMBOLS:
CLASS B2: FLAMMABLE LIQUID
CLASS D2A/B: MATERIALS CAUSING OTHER TOXIC EFFECTS

EUROPEAN COMMUNITY INFORMATION:

EUROPEAN COMMUNITY INFORMATION FOR PRODUCT:

EC LABELING AND CLASSIFICATION:
BASED ON THE INFORMATION ON THE PRODUCT'S COMPONENTS AND AN ASSESSMENT OF THE PHYSICAL AND HEALTH HAZARDS ASSOCIATED WITH THE MATERIAL, THE FOLLOWING ASSIGNMENTS HAVE BEEN MADE (PER COUNCIL DIRECTIVE 67/548/EEC)

EC CLASSIFICATION: HIGHLY FLAMMABLE. IRRITANT. (F; Xi)

EC RISK PHRASES:
HIGHLY FLAMMABLE. MAY FORM EXPLOSIVE PEROXIDES. IRRITATING TO EYES AND RESPIRATORY SYSTEM. (R:11-19-36/37)

EC SAFETY PHRASES:
KEEP OUT OF REACH OF CHILDREN.* KEEP AWAY FROM SOURCES OF IGNITION - NO SMOKING. DO NOT EMPTY INTO DRAINS. DO NOT BREATHE VAPORS. AVOID CONTACT WITH THE EYES. TAKE PRECAUTIONARY MEASURES AGAINST STATIC DISCHARGES.

(S:(2-)*16-23-25-29-33)

*THIS SAFETY PHRASE CAN BE OMITTED FROM THE LABEL WHEN THE SUBSTANCE OR PREPARATION IS SOLD FOR INDUSTRIAL USE ONLY.

EUROPEAN COMMUNITY ANNEX II HAZARD SYMBOLS:
(SYMBOL)

EUROPEAN COMMUNITY INFORMATION FOR CONSTITUENTS:
THE FOLLOWING INFORMATION IS AVAILABLE FOR PRIMARY CONSTITUENTS IN THE COMPONENTS OF THIS PRODUCT.

ACETONE:

EC CLASSIFICATION: HIGHLY FLAMMABLE. (F)

EC RISK PHRASES: HIGHLY FLAMMABLE. (R: 11).

EC SAFETY PHRASES:
KEEP OUT OF REACH OF CHILDREN.* KEEP CONTAINER IN A WELL-VENTILATED PLACE. KEEP AWAY FROM SOURCES OF IGNITION. NO SMOKING. DO NOT BREATHE VAPORS.

(S: (2-)*9-16-23-33).

EC COMMENTS:
*THIS SAFETY PHRASE CAN BE OMITTED FROM THE LABEL WHEN THE SUBSTANCE OR PREPARATION IS SOLD FOR INDUSTRIAL USE ONLY.

CYCLOHEXANONE:

EC CLASSIFICATION: FLAMMABLE. HARMFUL. (F: Xn)

EC RISK PHRASES: FLAMMABLE. HARMFUL BY INHALATION. (R: 10-20).

EC SAFETY PHRASES:
KEEP OUT OF REACH OF CHILDREN.* AVOID CONTACT WITH THE EYES. (S:(2-)* 26).
*THIS SAFETY PHRASE CAN BE OMITTED FROM THE LABEL WHEN THE SUBSTANCE OR PREPARATION IS SOLD FOR INDUSTRIAL USE ONLY.

EC COMMENTS:
CONCENTRATION GREATER THAN OR EQUAL TO 25%:
HARMFUL. HARMFUL BY INHALATION. (Xn; R20). THIS PRODUCT CONTAINS LESS THAN THIS CONCENTRATION; THEREFORE, THIS RISK HAS BEEN OMITTED.

METHYL ETHYL KETONE:

EC CLASSIFICATION: HIGHLY FLAMMABLE, IRRITANT. (F; Xi)

EC RISK PHRASES:
HIGHLY FLAMMABLE. IRRITATING TO THE EYES AND RESPIRATORY SYSTEM. (R: 11-36/37).

EC SAFETY PHRASES:
KEEP OUT OF REACH OF CHILDREN.* KEEP CONTAINER IN A WELL-VENTILATED PLACE. KEEP AWAY FROM SOURCES OF IGNITION. NO SMOKING. AVOID CONTACT WITH THE EYES. TAKE PRECAUTIONARY MEASURES AGAINST STATIC DISCHARGES.

(S: (2-)*9-16-25-33).

EC COMMENTS:
*THIS SAFETY PHRASE CAN BE OMITTED FROM THE LABEL WHEN THE SUBSTANCE OR PREPARATION IS SOLD FOR INDUSTRIAL USE ONLY.

TETRAHYDROFURAN:

EC CLASSIFICATION: HIGHLY FLAMMABLE. IRRITANT. (F; Xi)

EC RISK PHRASES:
HIGHLY FLAMMABLE. MAY FORM EXPLOSIVE PEROXIDES. IRRITATING TO EYES AND RESPIRATORY SYSTEM. (R: 11-19-36/37)

EC SAFETY PHRASES:
KEEP OUT OF REACH OF CHILDREN.* KEEP AWAY FROM SOURCES OF IGNITION - NO SMOKING. DO NOT EMPTY INTO DRAINS. TAKE PRECAUTIONARY MEASURES AGAINST STATIC DISCHARGES.

(S: (2-)*16-29-33)

*THIS SAFETY PHRASE CAN BE OMITTED FROM THE LABEL WHEN THE SUBSTANCE OR PREPARATION IS SOLD FOR INDUSTRIAL USE ONLY.

EC COMMENTS:

CONCENTRATIONS GREATER THAN OR EQUAL TO 25 PERCENT:
IRRITANT. IRRITATING TO EYES AND RESPIRATORY SYSTEM. (Xi; R36/37)

16. OTHER INFORMATION

PREPARED BY:
CHEMICAL SAFETY ASSOCIATES, INC.
9163 CHESAPEAKE DRIVE, SAN DIEGO, CA 92123-1002
619/565-0302

EDITED/UPDATED BY:
MICHAEL CUDAHY, TECHNICAL MANAGER, COOKSON ELECTRONICS

DATE OF PRINTING: JULY 13, 2004

ITEM: 5E528 - Cement 8 Oz Gray PVC Heavy Duty Lo

MSDS: A6352 **ORDER: 0074131139** **LP NUMBER: UCN9094839**

MATERIAL SAFETY DATA SHEET (MSDS)

This MSDS should be attached or kept with the respective product with which it is associated.

##

MATERIAL SAFETY DATA SHEET - A6352

Associated Grainger Items
5E530, 5E531, 5E525, 5E526, 5E527, 5E529, 5E528

MATERIAL SAFETY DATA SHEET

PREPARED TO U.S. OSHA, CMA, ANSI AND CANADIAN WHMIS, AND EUROPEAN COMMUNITY STANDARDS

PART I WHAT IS THE MATERIAL AND WHAT DO I NEED TO KNOW IN AN EMERGENCY?

1. PRODUCT IDENTIFICATION

GRAINGER 5E525, 5E526, 5E527, 5E529, 5E530, 5E531, 5E528

TRADE NAME (AS LABELED):
LOW VOC PVC SOLVENT CEMENTS:
REGULAR CLEAR PVC CEMENT
GRAY PVC CEMENT
BLUE PVC CEMENT

CHEMICAL NAME/CLASS: POLYVINYL CHLORIDE / SOLVENT MIXTURE

PRODUCT USE: SOLVENT CEMENT FOR PVC-BASED MATERIAL

SUPPLIER/MANUFACTURER'S NAME: COOKSON ELECTRONICS

U.S. ADDRESS:
1661 OLD DIXIE HIGHWAY
RIVIERA BEACH, FL 33404

U.S. BUSINESS PHONE:
1-800-327-8460
1-561-844-0241

U.S. EMERGENCY PHONE:
CHEMTREC:
1-800-424-9300 (U.S. AND CANADA)
1-703-527-3887 (INTERNATIONAL)

DATE OF PREPARATION: JAN. 30, 2004

2. COMPOSITION AND INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	EINECS #	% W/W
TETRAHYDROFURAN	109-99-9	203-726-8	40-60
METHYL ETHYL KETONE	78-93-3	201-159-0	1-12
POLYVINYL CHLORIDE RESIN	9002-86-2	206-625-7	<25
CYCLOHEXANONE	108-94-1	203-631-1	8-18
ACETONE	67-64-1	200-662-2	5-20
SILICON DIOXIDE	112945-52-5	UNLISTED	BALANCE

CHEMICAL NAME	EXPOSURE LIMITS IN AIR					
	ACGIH		OSHA		IDLH	OTHER
	TLV PPM	STEL PPM	PEL PPM	STEL PPM	PPM	
TETRAHYDROFURAN	200	250	200	250 (VACATED 1989 PEL)	2000 (BASED ON LEL)	NIOSH REL: TWA: 200 STEL: 250 DFG MAK: 50
METHYL ETHYL KETONE	200	300	200	300 (VACATED 1989 PEL)	3000	NIOSH REL: TWA: 200 STEL: 300 DFG MAK: 200 CARCINOGEN: EPA: D
POLYVINYL CHLORIDE RESIN	NE	NE	NE	NE	NE	CARCINOGEN: IARC: 3
CYCLOHEXANONE	25, SKIN, A3 (CONFIRMED ANIMAL CARCINOGEN WITH UNKNOWN RELEVANCE TO HUMANS)	NE	50 25 (VACATED 1989 PEL)	NE	700	NIOSH REL: TWA: 25, SKIN DFG MAK: DANGER OF CUTANEOUS ABSORPTION CARCINOGEN: IARC: 3 MAK: B
ACETONE	500 A4	750 1000 (NOT CLASSIFIABLE AS A HUMAN CARCINOGEN)	NE 750	2500 1000		NIOSH REL: TWA: 250 DFG MAK: 500 CARCINOGEN: EPA: D
SILICON DIOXIDE (EXPOSURE LIMITS ARE FOR SILICA- AMORPHOUS DIATOMACEOUS EARTH)	FOR CAS # 61790-53-2 (UNCALCINED) 10 MG/M3 (INHALABLE PARTICULATE) 3 MG/M3 (RESPIRABLE PARTICULATE)	NE	20 MPPCF OR 80 MG/M3/ % SiO2 6 MG/M3 (VACATED 1989 PEL)	3000 MG/M3	NIOSH REL: 6 MG/M3 (CAS # 61790-53-2)	DFG MAK: 4 MG/M3 CARCINOGEN: IARC: 3 (CAS # 61790-53-2)

NE = NOT ESTABLISHED
C = CEILING LIMIT.

SEE ORIGINAL MSDS FOR DEFINITIONS OF TERMS USED.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW:
THIS IS AN EXTREMELY FLAMMABLE LIQUID WITH AN ETHER-LIKE ODOR. THIS PRODUCT COMES IN A VARIETY OF COLORS. INHALATION OVEREXPOSURES TO THE VAPORS OF THIS PRODUCT CAN CAUSE CENTRAL-NERVOUS SYSTEM EFFECTS (E.G., DIZZINESS, DROWSINESS, NAUSEA, AND HEADACHES). THIS PRODUCT CAN BE MILDLY TO SEVERELY IRRITATING TO THE EYES, SKIN, AND OTHER CONTAMINATED TISSUE. VAPORS OF THIS PRODUCT ARE HEAVIER THAN AIR AND MAY TRAVEL TO A SOURCE OF IGNITION AND FLASHBACK TO A LEAK OR OPEN CONTAINER. TETRAHYDROFURAN, A COMPONENT OF THIS PRODUCT, IS KNOWN TO FORM EXPLOSIVE PEROXIDES UNDER CERTAIN CIRCUMSTANCES. EMERGENCY RESPONDERS MUST WEAR THE PROPER PERSONAL PROTECTIVE EQUIPMENT (AND HAVE APPROPRIATE FIRE PROTECTION) SUITABLE FOR THE SITUATION TO WHICH THEY ARE RESPONDING.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE:
THE MOST SIGNIFICANT ROUTES OF OCCUPATIONAL OVEREXPOSURE ARE INHALATION AND CONTACT WITH SKIN AND EYES. THE SYMPTOMS OF OVEREXPOSURE TO THIS PRODUCT, VIA ROUTE OF EXPOSURE, ARE AS FOLLOWS:

INHALATION:
INHALATION OF VAPORS, MISTS, OR SPRAYS OF THIS PRODUCT CAN BE IRRITATING TO THE NOSE, THROAT, MUCOUS MEMBRANES, AND OTHER TISSUES OF THE RESPIRATORY SYSTEM. SYMPTOMS OF OVEREXPOSURE CAN INCLUDE COUGHING, SNEEZING, AND SHORTNESS OF BREATH. ADDITIONALLY, THE COMPONENTS OF THIS PRODUCT ARE CENTRAL NERVOUS SYSTEM DEPRESSANTS. SYMPTOMS OF OVEREXPOSURE CAN INCLUDE DROWSINESS, DIZZINESS, FATIGUE, HEADACHE, NAUSEA, AND GENERAL ANESTHETIC EFFECTS. INHALATION OF HIGH CONCENTRATIONS OF THIS PRODUCT (AS MAY OCCUR IN A POORLY-VENTILATED AREA) MAY BE FATAL. BASED ON CLINICAL STUDIES INVOLVING TEST ANIMALS, CYCLOHEXANONE AND TETRAHYDROFURAN, COMPONENTS OF THIS PRODUCT, MAY CAUSE LIVER AND KIDNEY DAMAGE AFTER LONG-TERM INHALATION OVEREXPOSURES.

THIS PRODUCT MUST BE USED WITH ADEQUATE VENTILATION. MECHANICAL EXHAUST MAY BE NEEDED. ENSURE EXPOSURE TO VAPORS IS MINIMIZED BY USE OF APPROPRIATE ENGINEERING CONTROLS, WORK PRACTICES, AND PERSONAL PROTECTIVE EQUIPMENT, AS DESCRIBED IN THE REMAINDER OF THIS DOCUMENT.

CONTACT WITH SKIN OR EYES:
CONTACT WITH THIS PRODUCT CAN BE IRRITATING TO CONTAMINATED SKIN AND EYES. VAPORS OF THIS PRODUCT CAN REDDEN AND IRRITATE THE EYES. IF THE EYES ARE CONTAMINATED WITH SPLASHES, SPRAYS OR MISTS OF THIS PRODUCT, REDDENING, TEARING, AND CORNEAL OPACITY CAN OCCUR. THE LIQUID CAN BE MILDLY TO SEVERELY IRRITATING TO CONTAMINATED SKIN (DEPENDING ON DURATION OF EXPOSURE). PROLONGED OR REPEATED SKIN OVER-EXPOSURES CAN LEAD TO DERMATITIS.

SKIN ABSORPTION:
SKIN ABSORPTION IS A POTENTIAL ROUTE OF OVEREXPOSURE FOR CYCLOHEXANONE (A COMPONENT OF THIS PRODUCT). SYMPTOMS OF SUCH EXPOSURE CAN INCLUDE THOSE DESCRIBED UNDER "INHALATION" AND "CONTACT WITH SKIN AND EYES".

INGESTION:
INGESTION IS NOT ANTICIPATED TO BE A SIGNIFICANT ROUTE OF OCCUPATIONAL OVEREXPOSURE FOR THIS PRODUCT. IF INGESTION OCCURS, REFER TO SECTION 4 (FIRST-AID MEASURES) AND GET MEDICAL HELP IMMEDIATELY. IF INGESTION OF THIS PRODUCT DOES OCCUR, SYMPTOMS OF SUCH OVER-EXPOSURE CAN INCLUDE NAUSEA, VOMITING, AND OTHER SYMPTOMS DESCRIBED FOR "INHALATION". INGESTION CAN ALSO LEAD TO LIVER AND KIDNEY DAMAGE. INGESTION OF THIS PRODUCT MAY BE FATAL.

INJECTION:
INJECTION IS NOT ANTICIPATED TO BE A SIGNIFICANT ROUTE OF OVER-EXPOSURE FOR THIS PRODUCT. IF INJECTION DOES OCCUR (I.E. THROUGH A PUNCTURE BY AN OBJECT CONTAMINATED WITH THE PRODUCT), LOCAL IRRITATION AND SWELLING CAN OCCUR. ADDITIONAL SYMPTOMS MAY INCLUDE THOSE DESCRIBED FOR "INHALATION".

HEALTH EFFECTS OR RISKS FROM EXPOSURE: AN EXPLANATION IN LAY TERMS.

ACUTE:
OVER-EXPOSURE TO THIS PRODUCT CAN BE IRRITATING TO THE EYES, SKIN, AND MUCOUS MEMBRANES, AND CAN ALSO CAUSE CENTRAL-NERVOUS SYSTEM EFFECTS (DIZZINESS, DROWSINESS, NAUSEA AND HEADACHES). INGESTION OF THIS PRODUCT, OR INHALATION OF HIGH CONCENTRATIONS OF THIS PRODUCT'S VAPORS, MAY BE FATAL.

CHRONIC:
PROLONGED OR REPEATED SKIN EXPOSURES CAN LEAD TO DERMATITIS (DRYNESS, REDDENING AND IRRITATION OF THE SKIN). TETRAHYDROFURAN, A COMPONENT OF THIS PRODUCT, MAY CAUSE LIVER AND KIDNEY DAMAGE AFTER LONG-TERM INHALATION OVEREXPOSURES. THERE IS LIMITED EVIDENCE FROM ANIMAL STUDIES THAT METHYL EITHYL KETONE, A COMPONENT OF THIS PRODUCT, IS A REPRODUCTIVE TOXIN. REFER TO SECTION 11 (TOXICOLOGICAL INFORMATION) FOR ADDITIONAL INFORMATION. A REPORT FROM THE NATIONAL TOXICOLOGY PROGRAM (NTP) HAS SUGGESTED THAT EXPOSURE OF MICE AND RATS TO TETRAHYDROFURAN (THF) VAPOR LEVELS UP TO 1800 PPM 6 HR/DAY, 5 DAYS/WEEK FOR THEIR LIFETIMES CAUSED AN INCREASED INCIDENCE OF KIDNEY TUMORS IN MALE RATS AND LIVER TUMORS IN FEMALE MICE. NO EVIDENCE OF TUMORS WAS SEEN IN FEMALE RATS OR MALE MICE. THE SIGNIFICANCE OF THESE FINDINGS FOR HUMAN HEALTH IS UNCLEAR AT THIS TIME, AND MAY BE RELATED TO "SPECIES SPECIFIC" EFFECTS. ELEVATED INCIDENCES OF TUMORS IN HUMANS HAVE NOT BEEN REPORTED FOR THF. THE NTP, IARC, OR OSHA DOES NOT LIST THF AS A CARCINOGEN. ONE THF VENDOR (DUPONT) HAS RECOMMENDED A REDUCTION IN THE "ACCEPTABLE EXPOSURE LIMIT" FROM 200 PPM TO 25 PPM, 8 AND 12 HOUR TIME WEIGHTED AVERAGE AND A STEL OF 75 PPM.

TARGET ORGANS:
ACUTE: SKIN, EYES, RESPIRATORY SYSTEM, CENTRAL NERVOUS SYSTEM.
CHRONIC: LIVER, KIDNEYS.

HAZARDOUS MATERIAL INFORMATION SYSTEM:
HEALTH (BLUE) 2
FLAMMABILITY (RED) 3
REACTIVITY (YELLOW) 1
PROTECTIVE EQUIPMENT C/D

EYES: SPLASH GOGGLES
RESPIRATORY: SEE SECTION 8
HANDS: GLOVES
BODY: APRON

FOR ROUTINE APPLICATIONS.

SEE ORIGINAL MSDS FOR DEFINITION OF RATINGS

PART II WHAT SHOULD I DO IF A HAZARDOUS SITUATION OCCURS?

4. FIRST-AID MEASURES

SKIN EXPOSURE:
IF THIS PRODUCT CONTAMINATES THE SKIN, IMMEDIATELY BEGIN DECONTAMINATION WITH RUNNING WATER. MINIMUM FLUSHING IS FOR 15 MINUTES. REMOVE EXPOSED OR CONTAMINATED CLOTHING, TAKING CARE NOT TO CONTAMINATE EYES. THE CONTAMINATED INDIVIDUAL MUST SEEK MEDICAL ATTENTION IF ANY ADVERSE EFFECT OCCURS.

EYE EXPOSURE:
IF THIS PRODUCT'S LIQUID OR VAPORS ENTER THE EYES, OPEN VICTIM'S EYES WHILE UNDER GENTLY RUNNING WATER. USE SUFFICIENT FORCE TO OPEN EYELIDS. HAVE VICTIM "ROLL" EYES. MINIMUM FLUSHING IS FOR 15 MINUTES. THE CONTAMINATED INDIVIDUAL MUST SEEK IMMEDIATE MEDICAL ATTENTION.

INHALATION:
IF VAPORS, MISTS, OR SPRAYS OF THIS PRODUCT ARE INHALED, REMOVE VICTIM TO FRESH AIR. IF NECESSARY, USE ARTIFICIAL RESPIRATION TO SUPPORT VITAL FUNCTIONS. REMOVE OR COVER GROSS CONTAMINATION TO AVOID EXPOSURE TO RESCUERS.

INGESTION:
IF THIS PRODUCT IS SWALLOWED, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. IF PROFESSIONAL ADVICE IS NOT AVAILABLE, DO NOT INDUCE VOMITING. THE CONTAMINATED INDIVIDUAL SHOULD DRINK MILK, EGG WHITES, OR LARGE QUANTITIES OF WATER. NEVER INDUCE VOMITING OR GIVE DILUENTS (MILK OR WATER) TO SOMEONE WHO IS UNCONSCIOUS, HAVING CONVULSIONS, OR UNABLE TO SWALLOW.

THE CONTAMINATED INDIVIDUAL MUST BE TAKEN FOR MEDICAL ATTENTION, ESPECIALLY IF ANY ADVERSE EFFECT OCCURS. RESCUERS SHOULD BE TAKEN FOR MEDICAL ATTENTION, IF NECESSARY. TAKE A COPY OF LABEL AND MSDS TO HEALTH PROFESSIONAL WITH VICTIM.

5. FIRE-FIGHTING MEASURES

THE FOLLOWING INFORMATION IS VARIABLE, DEPENDING ON THE BLEND. THE FOLLOWING INFORMATION IS FOR TETRAHYDROFURAN, THE MAIN SOLVENT COMPONENT OF THIS PRODUCT.

FLASH POINT: -17 DEG. C (4.1 DEG. F)

AUTOIGNITION TEMPERATURE: 321 DEG. C (610 DEG. F)

FLAMMABLE LIMITS (IN AIR BY VOLUME):
LOWER (LEL): 1.8%
UPPER (UEL): 11.8%

THE FOLLOWING INFORMATION IS FOR THE PRODUCT.

FIRE EXTINGUISHING MATERIALS:
WATER SPRAY: YES (FOR COOLING ONLY)
CARBON DIOXIDE: YES
FOAM: YES
DRY CHEMICAL: YES
HALON: YES
OTHER: ANY "B" CLASS.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
THIS IS A CLASS I-B FLAMMABLE LIQUID. WHEN INVOLVED IN A FIRE, THIS MATERIAL MAY IGNITE AND PRODUCE IRRITATING VAPORS AND TOXIC GASES (E.G., CARBON MONOXIDE, CARBON DIOXIDE). THIS MATERIAL WILL READILY IGNITE AT ROOM TEMPERATURE. THE VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL TO A SOURCE OF IGNITION, AND FLASH BACK TO A LEAK OR OPEN CONTAINER. TETRAHYDROFURAN CAN FORM POTENTIALLY EXPLOSIVE PEROXIDES; CLOSED CONTAINERS CONTAMINATED WITH PEROXIDES CAN RUPTURE VIOLENTLY IN THE HEAT OF A FIRE.

EXPLOSION SENSITIVITY TO MECHANICAL IMPACT: NOT SENSITIVE.

EXPLOSION SENSITIVITY TO STATIC DISCHARGE:
THE VAPORS OF THIS PRODUCT CAN BE IGNITED BY STATIC ELECTRICAL ENERGY.

SPECIAL FIRE-FIGHTING PROCEDURES:
INCIPIENT FIRE RESPONDERS SHOULD WEAR EYE PROTECTION. STRUCTURAL FIREFIGHTERS MUST WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE EQUIPMENT. IF IT IS SAFE TO DO SO, ALLOW SMALL FIRES INVOLVING THIS PRODUCT TO BURN-OUT, WHILE PROTECTING EXPOSURES. IF POSSIBLE, PREVENT RUNOFF WATER FROM ENTERING STORM DRAINS, BODIES OF WATER, OR OTHER ENVIRONMENTALLY SENSITIVE AREAS. IF NECESSARY, RINSE CONTAMINATED EQUIPMENT THOROUGHLY BEFORE RETURNING SUCH EQUIPMENT TO SERVICE.

NFPA RATING:
HEALTH 2
FLAMMABILITY 3
REACTIVITY 1
OTHER

SEE ORIGINAL MSDS FOR DEFINITION OF RATINGS

6. ACCIDENTAL RELEASE MEASURES

RELEASE RESPONSE:
IN CASE OF A SPILL, CLEAR THE AFFECTED AREA AND PROTECT PEOPLE. UNCONTROLLED RELEASES SHOULD BE RESPONDED TO BY TRAINED PERSONNEL USING PRE-PLANNED PROCEDURES. PROPER PROTECTIVE EQUIPMENT SHOULD BE USED.

SMALL RELEASES (E.G., 1-PINT) MUST BE CLEANED-UP BY PERSONNEL WEARING GLOVES, GOGGLES, AND APPROPRIATE EYE PROTECTION. FACE SHIELDS MUST BE WORN IF SPLASHES OR SPRAYS OF THIS PRODUCT MAY BE GENERATED. IN THE EVENT OF A NON-INCIDENTAL RELEASE (E.G., FIVE, 1-GALLON CONTAINERS LEAKING SIMULTANEOUSLY IN A POORLY-VENTILATED AREA), THE MINIMUM PERSONAL PROTECTIVE EQUIPMENT SHOULD BE LEVEL B: TRIPLE-GLOVES (RUBBER GLOVES AND NITRILE GLOVES, OVER LATEX GLOVES), CHEMICALLY RESISTANT SUIT AND BOOTS, HARD-HAT, AND SELF-CONTAINED BREATHING APPARATUS. LEVEL B SHOULD ALWAYS BE USED DURING RESPONSES IN WHICH THE OXYGEN LEVEL IS BELOW 19.5% OR UNKNOWN.

ELIMINATE ALL SOURCES OF IGNITION BEFORE SPILL CLEAN-UP BEGINS. USE NON-SPARKING TOOLS. ABSORB SPILLED LIQUID WITH ACTIVATED CARBON, POLYPADS OR OTHER SUITABLE ABSORBENT MATERIALS. MONITOR THE AREA FOR COMBUSTIBLE VAPORS AND THE LEVEL OF OXYGEN. MONITORING MUST INDICATE LESS THAN 10% OF THE LEL (SEE SECTION 5, FIRE-FIGHTING MEASURES) AND GREATER THAN 19.5% OXYGEN IS IN THE ATMOSPHERE BEFORE PERSONNEL ARE PERMITTED IN THE AREA WITHOUT LEVEL B PROTECTION. PLACE ALL SPILL RESIDUE IN AN APPROPRIATE CONTAINER AND SEAL. DISPOSE OF IN ACCORDANCE WITH U.S. FEDERAL, STATE, OR LOCAL PROCEDURES, THE APPLICABLE STANDARDS OF CANADA AND ITS PROVINCES, OR THE APPROPRIATE REQUIREMENTS OF EUROPEAN COMMUNITY MEMBER STATES (SEE SECTION 13, DISPOSAL CONSIDERATIONS).

PART III HOW CAN I PREVENT HAZARDOUS SITUATIONS FROM OCCURRING?

7. HANDLING AND STORAGE

WORK PRACTICES AND HYGIENE PRACTICES:
AS WITH ALL CHEMICALS, AVOID GETTING THIS PRODUCT ON YOU OR IN YOU. WASH THOROUGHLY AFTER HANDLING THIS PRODUCT. DO NOT EAT, DRINK, SMOKE, OR APPLY COSMETICS WHILE HANDLING THIS PRODUCT. AVOID BREATHING VAPORS OR MISTS GENERATED BY THIS PRODUCT. REMOVE CONTAMINATED CLOTHING IMMEDIATELY.

STORAGE AND HANDLING PRACTICES:
ALL EMPLOYEES WHO HANDLE THIS MATERIAL SHOULD BE TRAINED TO HANDLE IT SAFELY. CONTAINERS OF THIS PRODUCT MUST BE PROPERLY LABELED. IF THIS MIXTURE IS USED IN OTHER TYPES OF CONTAINERS, ONLY USE PORTABLE CONTAINERS APPROVED FOR FLAMMABLE LIQUIDS. POST "NO SMOKING" SIGNS, WHERE APPROPRIATE IN STORAGE AND USE AREAS. USE NON-SPARKING TOOLS. BOND AND GROUND DURING TRANSFER OF MATERIAL. STORE CONTAINERS OF THE PRODUCT IN A COOL, DRY LOCATION, AWAY FROM DIRECT SUNLIGHT, SOURCES OF INTENSE HEAT, OR WHERE FREEZING IS POSSIBLE. MATERIAL SHOULD BE STORED IN SECONDARY CONTAINERS, OR IN A DIKED AREA, AS APPROPRIATE. STORE CONTAINERS AWAY FROM INCOMPATIBLE CHEMICALS. KEEP CONTAINER TIGHTLY CLOSED WHEN NOT IN USE. STORAGE AREAS SHOULD BE MADE OF FIRE-RESISTANT MATERIALS. INSPECT ALL INCOMING CONTAINERS BEFORE STORAGE, TO ENSURE CONTAINERS ARE PROPERLY LABELED AND NOT DAMAGED. REFER TO NFPA 30, FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE FOR ADDITIONAL INFORMATION ON STORAGE. EMPTY CONTAINERS MAY CONTAIN RESIDUAL FLAMMABLE LIQUID OR VAPORS. THEREFORE, EMPTY CONTAINERS SHOULD BE HANDLED WITH CARE. DO NOT EXPOSE "EMPTY" CONTAINERS TO WELDING TOUCHES, OR ANY OTHER SOURCE OF IGNITION.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS:
USE WITH ADEQUATE VENTILATION. MECHANICAL EXHAUST MAY BE NEEDED.

EMERGENCY EYE-WASH/SAFETY SHOWERS:
WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE-WASH FOUNTAIN/SAFETY SHOWER WITHIN THE WORK AREA FOR EMERGENCY USE.

RESPIRATORY PROTECTION:
RESPIRATORY PROTECTION IS NOT GENERALLY NEEDED WHEN USING THIS PRODUCT. MAINTAIN AIRBORNE CONTAMINANT CONCENTRATIONS BELOW GUIDELINES LISTED IN SECTION 2 (COMPOSITION, INFORMATION ON INGREDIENTS). IF RESPIRATORY PROTECTION IS NEEDED, USE ONLY PROTECTION AUTHORIZED IN 29 CFR 1910.134 OR APPLICABLE STATE REGULATIONS. USE SUPPLIED AIR RESPIRATION PROTECTION IF OXYGEN LEVELS ARE BELOW 19.5% OR ARE UNKNOWN. RESPIRATORY PROTECTION GUIDELINES FOR TETRAHYDROFURAN (A COMPONENT OF THIS PRODUCT) ARE PROVIDED ON THE FOLLOWING.

NIOSH/OSHA RECOMMENDATIONS FOR TETRAHYDROFURAN CONCENTRATIONS IN AIR:

UP TO 2000 PPM:
SUPPLIED AIR RESPIRATOR (SAR) OPERATED IN A CONTINUOUS-FLOW MODE, FULL-FACEPIECE CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S), GAS MASK WITH ORGANIC VAPOR CANISTER, POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S), FULL-FACEPIECE SELF-CONTAINED BREATHING APPARATUS (SCBA), OR FULL-FACEPIECE SAR.

EMERGENCY OR PLANNED ENTRY INTO UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS:
POSITIVE PRESSURE, FULL-FACEPIECE SCBA OR POSITIVE PRESSURE, FULL-FACEPIECE SAR WITH AN AUXILIARY POSITIVE PRESSURE SCBA.

ESCAPE: GAS MASK WITH ORGANIC VAPOR CANISTER OR ESCAPE-TYPE SCBA.

NOTE:
THE IDLH CONCENTRATION FOR TETRAHYDROFURAN IS 2000 PPM. THIS VALUE IS BASED ON THE LOWER EXPLOSIVE LIMIT (LEL). RESPIRATORY PROTECTION EQUIPMENT MAY NOT BE ADEQUATE FOR FIRE SITUATIONS.

EYE PROTECTION:
SPLASH GOGGLES OR SAFETY GLASSES. FACE SHIELD SHOULD BE WORN WHEN WORKING IN SITUATIONS IN WHICH SPLASHES OR SPRAYS CAN BE GENERATED.

HAND PROTECTION:
WEAR GLOVES FOR ROUTINE INDUSTRIAL USE TO PROTECT HANDS FROM CONTACT. FOR LONG EXPOSURES, OR UNUSUAL CONTACT, SUCH AS SPILL CLEANUP, CHEMICAL RESISTANT GLOVES MAY BE REQUIRED. SEE SECTION 6.

BODY PROTECTION:
USE BODY PROTECTION APPROPRIATE FOR TASK (E.G., APRON OR TYVEK SUIT).

9. PHYSICAL AND CHEMICAL PROPERTIES

FOR TETRAHYDROFURAN (THE MAIN SOLVENT COMPONENT OF THIS PRODUCT):

RELATIVE VAPOR DENSITY (AIR = 1): 2.5

EVAPORATION RATE (nBuAc = 1): 8-14.5

SPECIFIC GRAVITY (WATER = 1): APPROXIMATELY 0.91

FREEZING/MELTING POINT: -1.85 DEG. C (-16 DEG. F)

SOLUBILITY IN WATER @ 25 DEG. C: 30%

BOILING POINT: 66 DEG. C (151 DEG. F)

VAPOR PRESSURE, MMHg @ 20 DEG. C: 129

pH: NOT ESTABLISHED.

ODOR THRESHOLD: 2.48-3.47 PPM

COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT): 0.46

FOR THIS PRODUCT:

ODOR THRESHOLD: NOT APPLICABLE.

FORM: LIQUID.

COLOR: VARIABLE COLOR.

ODOR: ETHEREAL.

VISCOSITY: NOT AVAILABLE.

FLASH POINT: -17 DEG. C (4.1 DEG. F) (TETRAHYDROFURAN)

HOW TO DETECT THIS SUBSTANCE (WARNING PROPERTIES):
THE COLOR AND ODOR OF THE PRODUCT MAY BE DISTINCTIVE PROPERTIES OF THIS PRODUCT.

10. STABILITY AND REACTIVITY

STABILITY: STABLE.

NOTE:
TETRAHYDROFURAN, A COMPONENT OF THIS PRODUCT, CAN FORM POTENTIALLY EXPLOSIVE PEROXIDE COMPOUNDS WHEN EXPOSED TO LIGHT OR AIR. THOUGH THIS PRODUCT CONTAINS INHIBITORS TO PREVENT PEROXIDE FORMATION, CARE SHOULD BE USED WHEN STORING THIS PRODUCT, OR HANDLING OLD CONTAINERS OF THIS MATERIAL.

DECOMPOSITION PRODUCTS:
CARBON MONOXIDE, CARBON DIOXIDE, SILICON AND CHLORIDE COMPOUNDS.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE:
THIS PRODUCT WILL NOT BE COMPATIBLE WITH STRONG OXIDIZERS, LITHIUM ALUMINUM HYDRIDE, AND ALKALINE EARTH HYDROXIDES.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR.

CONDITIONS TO AVOID:
AVOID EXPOSURE OR CONTACT TO EXTREME TEMPERATURES, SOURCES OF IGNITION, INCOMPATIBLE CHEMICALS.

PART IV IS THERE ANY OTHER USEFUL INFORMATION ABOUT THIS MATERIAL?

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA:
THE SPECIFIC TOXICOLOGY DATA AVAILABLE FOR COMPONENTS GREATER THAN 1% IN CONCENTRATION ARE AS FOLLOWS.

CYCLOHEXANONE:

EYE EFFECTS-HUMAN: 75 PPM

SKIN: RABBIT, ADULT: 500 MG OPEN MILD IRRITATION EFFECTS

ORAL-RAT LD50: 1535 MG/KG

ORAL-MOUSE LD50: 1400 MG/KG

SUBCUTANEOUS-RAT LD50: 2170 MG/KG

INTRAPERITONEAL-MOUSE LD50: 1350 MG/KG

SUBCUTANEOUS-MOUSE LDLO: 1300 MG/KG

INTRAVENOUS-DOG, ADULT LDLO: 630 MG/KG

ORAL-RABBIT, ADULT LDLO: 1600 MG/KG

SKIN-RABBIT, ADULT LD50: 948 MG/KG

TCLO - INHALATION - RAT:
105 MG/M3/4 HOURS:
FEMALE 1-20 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - FERTILITY - PRE-IMPLANTATION MORTALITY

TDLO - ORAL - MOUSE:
11 GM/KG:
FEMALE 8-12 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - EFFECTS ON NEWBORN - GROWTH STATISTICS (E.G. %, REDUCED WEIGHT GAIN)

MUTATION IN MICROORGANISMS:
BACTERIA - SALMONELLA TYPHIMURIUM: 20 (MICRO)L/

MUTATION IN MICROORGANISMS:
BACTERIA - BACILLUS SUBTILIS: 200 (MICRO)L/L

CYTOGENETIC ANALYSIS:
HUMAN LEUKOCYTE: 100 (MICRO)MOL/L

CYTOGENETIC ANALYSIS:
HUMAN LYMPHOCYTE: 5 (MICRO)G/L

SISTER CHROMATID EXCHANGE:
RODENT - HAMSTER OVARY: 7500 (MICRO)L/L

MUTATION IN MAMMALIAN SOMATIC:
RODENT - HAMSTER OVARY: 7500 (MICRO)L/L

METHYL ETHYL KETONE:

EYE EFFECTS-HUMAN: 350 PPM

SKIN-RABBIT, ADULT: 500 MG/24 HOURS; MODERATE IRRITATION EFFECTS

SKIN-RABBIT, ADULT: 402 MG/24 HOURS; MILD IRRITATION EFFECTS

SKIN-RABBIT, ADULT: 13,780 MG/24H OPEN MILD IRRITATION EFFECTS

EYE EFFECTS-RABBIT, ADULT: 80 MG

INTRAPERITONEAL-MOUSE LD50: 616 MG/KG

SKIN-RABBIT, ADULT LD50: 6450 MG/KG

SEX CHROMOSOME LOSS AND NONDISJUNCTION:
SACCHAROMYCES CEREVISIAE: 33,800 PPM

INHALATION-RAT TCLO:
1000 PPM/(6-15D PREG): TERATOGENIC EFFECTS

INHALATION-HUMAN TCLO:
100 PPM/5 MINUTES: IRRITANT EFFECTS

ORAL-RAT LD50: 2737 MG/KG

INHALATION-RAT LC50: 23,500 MG/M3/8 HOURS

INTRAPERITONEAL-RAT LD50: 607 MG/KG

ORAL-MOUSE LD50: 4050 MG/KG

INHALATION-MOUSE LC50: 40 G/M3/2 HOURS

INTRAPERITONEAL-GUINEA PIG, ADULT LDLO: 2 G/KG

INHALATION-UNSPECIFIED EFFECTS LC50: 38 G/M3

INHALATION-RAT TCLO: 5000 PPM/6H/90 DAYS - INTERMITTENT

TDLO - SUBCUTANEOUS - CAT:
55500 MG/KG/37 WEEKS - INTERMITTENT:
REPRODUCTIVE - TUMORIGENIC EFFECTS - OTHER REPRODUCTIVE SYSTEM TUMORS

TCLO - INHALATION - RAT:
3000 PPM/7 HOURS:
FEMALE 6-15 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - SPECIFIC DEVELOPMENTAL ABNORMALITIES - CRANIOFACIAL (INCLUDING NOSE AND TONGUE), UROGENITAL SYSTEM, HOMEOSTASIS

TCLO - INHALATION - RAT:
1000 PPM/7 HOURS:
FEMALE 6-15 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - EFFECTS ON EMBRYO OR FETUS - FETOTOXICITY (EXCEPT DEATH, E.G., STUNTED FETUS) REPRODUCTIVE - SPECIFIC DEVELOPMENTAL ABNORMALITIES - MUSCULOSKELETAL SYSTEM

TCLO - INHALATION - MOUSE:
3000 PPM/7H:
FEMALE 6-15 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - EFFECTS ON EMBRYO OR FETUS - FETOTOXICITY

POLYVINYL CHLORIDE RESIN:

ORAL-RAT TDLO:
210 G/KG/30 WEEKS - CONTINUOUS: EQUIVOCAL TUMORIGENIC AGENT

IMPLANT-RAT TDLO:
75 MG/KG: EQUIVOCAL TUMORIGENIC AGENT

SILICON DIOXIDE:

UNSCHEDULED DNA SYNTHESIS-RAT-INTRATRACHEAL: 120 MG/KG

BODY FLUID ASSAY-RAT:
LUNG: 120 MG/KG

INHALATION-RAT TCLO: 50 MG/M3/6 HOURS/2 YEARS - INTERMITTENT

ORAL-RAT LD50: 3160 MG/KG

INTRAPERITONEAL-RAT LDLO: 50 MG/KG

INTRAVENOUS-RAT LD50: 15 MG/KG

INTRATRACHEAL-RAT LDLO: 10 MG/KG

INTRAPERITONEAL-GUINEA PIG, ADULT LDLO: 120 MG/KG

TETRAHYDROFURAN:

MUTATION IN MICROORGANISMS-ESCHERICHIA COLI: 1 (MICRO)MOL/L

INHALATION-HUMAN TCLO:
25,000 PPM: CENTRAL NERVOUS SYSTEM EFFECTS

ORAL-RAT LD50: 1650 MG/KG.

INHALATION-RAT LC50: 21,000 PPM/3H

INTRAPERITONEAL-RAT LD50: 2900 MG/KG

INHALATION-MOUSE LCLO: 24,000 MG/M3/2 HOURS

INTRAPERITONEAL-MOUSE LD50: 1900 MG/KG

INTRAPERITONEAL-GUINEA PIG, ADULT LDLO: 500 MG/KG

INHALATION-RAT TCLO: 5000 PPM/6 HOURS/91 DAYS - INTERMITTENT

TCLO - INHALATION - RAT:
5000 PPM/6H:
FEMALE 6-19 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - EFFECTS ON EMBRYO OR FETUS - FETOTOXICITY

TCLO - INHALATION - MOUSE:
1800 PPM/6H:
FEMALE 6-17 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - FERTILITY - POST-IMPLANTATION MORTALITY

MUTATION IN MICROORGANISMS:
BACTERIA - ESCHERICHIA COLI: 1 (MICRO)MOL/L

SUSPECTED CANCER AGENT:
COMPONENTS OF THIS PRODUCTS ARE LISTED AS FOLLOWS:

CYCLOHEXANONE:
IARC-3: NOT CLASSIFIABLE AS A HUMAN CARCINOGEN.
MAK-B: JUSTIFIABLY SUSPECTED OF HAVING CARCINOGENIC POTENTIAL.

METHYL ETHYL KETONE:
EPA-D: NOT CLASSIFIABLE AS TO HUMAN CARCINOGENICITY.

POLYVINYL CHLORIDE RESIN:
IARC-3: NOT CLASSIFIABLE AS A HUMAN CARCINOGEN.

SILICON DIOXIDE:
IARC-3: NOT CLASSIFIABLE AS A HUMAN CARCINOGEN.

THIS PRODUCT'S COMPONENTS ARE NOT FOUND ON THE FOLLOWING LISTS: FEDERAL OSHA Z LIST, NTP, IARC, AND CAL/OSHA AND THEREFORE ARE NEITHER CONSIDERED TO BE NOR SUSPECTED TO BE CANCER-CAUSING AGENTS BY THESE AGENCIES.

IRRITANCY OF PRODUCT:
THIS PRODUCT IS EXPECTED TO MILDLY TO SEVERELY IRRITATE THE SKIN AND EYES.

SENSITIZATION TO THE PRODUCT:
NO COMPONENT OF THIS PRODUCT IS KNOWN TO BE A SENSITIZER WITH PROLONGED OR REPEATED USE.

REPRODUCTIVE TOXICITY INFORMATION:
LISTED BELOW IS INFORMATION CONCERNING THE EFFECTS OF THIS PRODUCT AND ITS COMPONENTS ON THE HUMAN REPRODUCTIVE SYSTEM.

MUTAGENICITY:
THIS PRODUCT IS NOT REPORTED TO PRODUCE MUTAGENIC EFFECTS IN HUMANS. HUMAN MUTATION DATA ARE AVAILABLE FOR CYCLOHEXANONE (A COMPONENT OF THIS PRODUCT);
THESE DATA WERE OBTAINED ON SPECIFIC HUMAN TISSUES EXPOSED TO RELATIVELY HIGH DOSES. ANIMAL MUTATION DATA ARE AVAILABLE FOR METHYL ETHYL KETONE, SILICON DIOXIDE, AND TETRAHYDROFURAN (COMPONENTS OF THIS PRODUCT); THESE DATA WERE OBTAINED DURING CLINICAL STUDIES ON SPECIFIC ANIMAL TISSUES OR MICROORGANISMS EXPOSED TO HIGH CLOSES OF THESE COMPOUNDS.

EMBRYOTOXICITY:
THIS PRODUCT IS NOT REPORTED TO PRODUCE EMBRYOTOXIC EFFECTS IN HUMANS.

TERATOGENICITY:
THIS PRODUCT IS NOT REPORTED TO CAUSE TERATOGENIC EFFECTS IN HUMANS. THREE ANIMAL STUDIES INVOLVING METHYL ETHYL KETONE (A COMPONENT OF THIS PRODUCT) HAVE SHOWN FETOTOXICITY (SKELETAL ANOMALIES) AT DOSES WHICH DID NOT PRODUCE SIGNIFICANT MATERNAL TOXICITY.

REPRODUCTIVE TOXICITY:
THIS PRODUCT IS NOT REPORTED TO CAUSE REPRODUCTIVE EFFECTS IN HUMANS. REPRODUCTIVE TOXICITY DATA ARE AVAILABLE FOR METHYL ETHYL KETONE AND TETRAHYDROFURAN (A COMPONENT OF THIS PRODUCT); THESE DATA WERE OBTAINED FROM CLINICAL STUDIES ON TEST ANIMALS EXPOSED TO RELATIVELY HIGH DOSES.

A MUTAGEN IS A CHEMICAL WHICH CAUSES PERMANENT CHANGES TO GENETIC MATERIAL (DNA) SUCH THAT THE CHANGES WILL PROPAGATE THROUGH GENERATIONAL LINES. AN EMBRYOTOXIN IS A CHEMICAL WHICH CAUSES DAMAGE TO A DEVELOPING EMBRYO (I.E. WITHIN THE FIRST EIGHT WEEKS OF PREGNANCY IN HUMANS), BUT THE DAMAGE DOES NOT PROPAGATE ACROSS GENERATIONAL LINES. A TERATOGEN IS A CHEMICAL WHICH CAUSES DAMAGE TO A DEVELOPING FETUS, BUT THE DAMAGE DOES NOT PROPAGATE ACROSS GENERATIONAL LINES. A REPRODUCTIVE TOXIN IS ANY SUBSTANCE WHICH INTERFERES IN ANY WAY WITH THE REPRODUCTIVE PROCESS.

ACGIH BIOLOGICAL EXPOSURE INDICES:
CURRENTLY, THERE ARE ACGIH BIOLOGICAL EXPOSURE INDICES (BEIS) ASSOCIATED WITH COMPONENTS OF THIS PRODUCT, AS FOLLOWS:

CHEMICAL DETERMINANT	SAMPLING TIME	BEI
ACETONE:		
ACETONE IN URINE	END OF SHIFT	100 MG/L
METHYL ETHYL KETONE (MEK):		
MEK IN URINE	END OF SHIFT	2 MG/L
TETRAHYDROFURAN (INTENDED):		
TETRAHYDROFURAN IN URINE	END OF SHIFT	8 MG/L

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:
PREEXISTING RESPIRATORY PROBLEMS, DERMATITIS, AND OTHER SKIN DISORDERS, AS WELL AS CONDITIONS INVOLVING THE "TARGET ORGANS" (SEE SECTION 3, HAZARD IDENTIFICATION) CAN BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT.

RECOMMENDATIONS TO PHYSICIANS:
TREAT SYMPTOMS AND ELIMINATE OVEREXPOSURE. IF NECESSARY, REVIEW FOR BRAIN AND CENTRAL NERVOUS SYSTEM EFFECTS AND CONDUCT PULMONARY FUNCTION TEST. OTHER TESTS FOR LUNG, KIDNEY, AND LIVER EFFECTS MAY ALSO PROVE USEFUL.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY:
THE COMPONENTS OF THIS PRODUCT WILL BIODEGRADE INTO OTHER ORGANIC COMPOUNDS. ENVIRONMENTAL DATA ARE AVAILABLE FOR COMPONENTS OF THIS PRODUCT, AS FOLLOWS:

CYCLOHEXANONE:
KOC: 0.81.
WATER SOLUBILITY: 23,000 MG/L.
CYCLOHEXANONE IS NOT RAPIDLY VOLATILIZED FROM WATER, EXCEPT FOR FAST MOVING STREAMS OR VERY SHALLOW PONDS. SIGNIFICANT SOIL TEACHING OCCURS, CONTRIBUTING TO GROUND WATER CONTAMINATION. BIODEGRADATION AND PHOTOLYSIS OCCUR IN WATER. RAPID ATMOSPHERIC DEGRADATION OCCURS VIA PHOTOLYSIS, WITH A HALF-LIFE OF ABOUT 1 TO 5 DAYS.

METHYL ETHYL KETONE:
LOG KOW: 0.29.
WATER SOLUBILITY: 239,000 MG/L.
METHYL ETHYL KETONE IS RAPIDLY VOLATILIZED FROM WATER AND UNDERGOES SLOW BIODEGRADATION. IT UNDERGOES MODERATE ATMOSPHERIC PHOTODEGRADATION.

TETRAHYDROFURAN:
WATER SOLUBILITY: 30% (25 DEG. C).
TETRAHYDROFURAN IS SIGNIFICANTLY BIODEGRADED IN STANDARD TESTS. THIS COMPOUND IS NOT EXPECTED TO BIOCONCENTRATE IN FISH SIGNIFICANTLY.

EFFECT OF MATERIAL ON PLANTS OR ANIMALS:
THIS PRODUCT CAN BE HARMFUL OR FATAL TO CONTAMINATED PLANT OR ANIMAL LIFE, ESPECIALLY IF RELEASED IN LARGE QUANTITIES INTO THE ENVIRONMENT. REFER TO SECTION 11 (TOXICOLOGICAL INFORMATION) FOR INFORMATION REGARDING THE EFFECT OF THIS PRODUCT'S COMPONENTS ON TEST ANIMALS.

EFFECT OF CHEMICAL ON AQUATIC LIFE:
THIS PRODUCT CAN BE HARMFUL OR FATAL TO CONTAMINATED AQUATIC PLANT OR ANIMAL LIFE, ESPECIALLY IF RELEASED IN LARGE QUANTITIES IN A BODY OF WATER. THE FOLLOWING AQUATIC TOXICITY DATA ARE AVAILABLE FOR THE COMPONENTS OF THIS PRODUCT:

CYCLOHEXANONE:
LC50 (PIMEPHALES PROMELAS FATHEAD MINNOW): 527 MG/L 96 HOURS
EC0 (BACTERIA PSEUDOMONAS PUTIDA) 16 HOURS: 180 MG/L
EC0 (ALGAE MICROCYSTIS AERUGINOSA) 8 DAYS: 52 MG/L
EC0 (GREEN ALGAE SCENEDESMUS QUADRICAUDA) 7 DAYS: 370 MG/L
EC0 (PROTOZOA ENTOSIPHON SULCATUM) 72 HOURS: 545 MG/L
EC0 (PROTOZOA URONEMA PARDUCZI CHATTON-LWOFF): 280 MG/L
EC0 (BACTERIA PSEUDOMONAS FLUORESCENS) 16 HOURS: 180 MG/L (pH = 7)
EC0 (CHLLOMONAS PARAMECIUM EHRENBERG) 48 HOURS: 573 MG/L
EC0 (DAPHNIA MAGNA STRAUS) 24 HOURS: 526 MG/L
EC50 (DAPHNIA MAGNA STRAUS) 24 HOURS: 820 MG/L
EC100 (DAPHNIA MAGNA STRAUS) 24 HOURS: 1,240 MG/L
EC0 (DAPHNIA MAGNA) 24 HOURS: 540 MG/L
EC50 (DAPHNIA MAGNA) 24 HOURS: 800 MG/L
EC100 (DAPHNIA MAGNA) 24 HOURS: 1,540 MG/L
LC50 (FATHEAD MINNOW) 96 HOURS: 526; 618; 630 MG/L
LC50 (LEUCISCUS IDUS) 24 HOURS: 538 MG/L
LC50 (LEUCISCUS IDUS) 96 HOURS: 536; 539; 752 MG/L

METHYL ETHYL KETONE:
EC0 (SCENEDESMUS QUADRICAUDA, GREEN ALGAE): 4300 MG/L/8 DAYS
EC0 (ENTOSIPHON SULCATUM, PROTOZOA): 190 MG/L/72 HOURS
EC0 (URONEMA PARDUCZI CHATTON-LWOLL, PROTOZOA): 2830 MG/L
EC0 (PSEUDOMONAS PUTIDA, BACTERIA): 1150 MG/L/16 HOURS
LC50 (PIMEPHALES PROMELAS, FATHEAD MINNOW): 3200 MG/L/96 HOUR
LD0 (PSEUDOMONAS, BACTERIA): 2,500 MG/L
LD0 (SCENEDESMUS, ALGAE): 12,500 MG/L
LD0 (COLPODA, PROTOZOA): 5,000 MG/L
LC50 (MOSQUITO FISH): 5,600 MG/L/24-96 HOURS
LC50 (BLUEGILL): 5,640-1,690 MG/L/24-96 HOURS
LC50 (GOLDFISH): 5,000 MG/L/24 HOURS

TETRAHYDROFURAN:

GROWTH INHIBITION (MICROCYSTIS, BLUE ALGEA): 225 MG/L

TOXICITY THRESHOLD (CELL MULTIPLICATION INHIBIT SYSTEM TEST):
(URONEMA PARDUCZI CHATTON-LWOFF, PROTOZOA): 858 MG/L
(PSEUDOMONAS PUTIDA, BACTERIA): 580 MG/L
(MICROCYTIS AERUGINOSA, ALGEA): 225 MG/L

LC50 (SILVER/GOLDEN ORFE): 2820-2930 MG/L

LC50 (FATHEAD MINNOW): 2160 MG/L/96 HOURS

LC50 (CARP): 4400 MG/L/48 HOURS

LC50 (GOLDFISH): 2400 MG/L/48 HOURS

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL:
WASTE DISPOSAL MUST BE IN ACCORDANCE WITH APPROPRIATE U.S. FEDERAL, STATE, AND LOCAL REGULATIONS, THOSE OF CANADA AND ITS PROVINCES, AS WELL AS THOSE APPLICABLE TO THE EC MEMBER STATES. THIS PRODUCT, IF UNALTERED BY USE, MAY BE DISPOSED OF BY TREATMENT AT A PERMITTED FACILITY OR AS ADVISED BY YOUR LOCAL HAZARDOUS WASTE REGULATORY AUTHORITY.

U.S. EPA WASTE NUMBER: D001 (CHARACTERISTIC/IGNITABILITY)

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME:
FLAMMABLE LIQUID, NOS (ACETONE, TETRAHYDROFURAN, METHYL ETHYL KETONE, CYCLOHEXANONE)

HAZARD CLASS NUMBER AND DESCRIPTION: 3 (FLAMMABLE LIQUID)

UN IDENTIFICATION NUMBER: UN 1993

PACKING GROUP: II

DOT LABEL(S) REQUIRED: FLAMMABLE LIQUID

NOTE:
SHIPMENTS OF CONTAINERS HOLDING 1-LITER OR LESS IN VOLUME QUALIFY FOR A "LIMITED QUANTITY" EXCEPTION. REFER TO 49 CFR 173.150 FOR ADDITIONAL INFORMATION.

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER, 1996: 128

MARINE POLLUTANT:
NO COMPONENT OF THIS PRODUCT IS DESIGNATED AS A MARINE POLLUTANT BY THE DOT (PER 49 CFR 172.101, APPENDIX B).

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:
THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. USE THE ABOVE INFORMATION FOR THE PREPARATION OF CANADIAN SHIPMENTS.

IMO DESIGNATION:
THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS BY THE INTERNATIONAL MARITIME ORGANIZATION

PROPER SHIPPING NAME:
FLAMMABLE LIQUID, NOS (ACETONE, TETRAHYDROFURAN, METHYL ETHYL KETONE, CYCLOHEXANONE)

HAZARD CLASS NUMBER AND DESCRIPTION:
3.2 (FLAMMABLE LIQUID; INTERMEDIATE FLASH POINT)

UN IDENTIFICATION NUMBER: UN 1993

PACKING GROUP: II

LABEL(S) REQUIRED: FLAMMABLE LIQUID

IMDG CODE: 3230

MARINE POLLUTANT:
THIS PRODUCT IS NOT DESIGNATED BY THE IMO TO BE A MARINE POLLUTANT.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):
THIS MATERIAL IS NOT CONSIDERED BY THE UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE TO BE DANGEROUS GOODS. ADDITIONAL INFORMATION IS AS FOLLOWS:

SUBSTANCE IDENTIFICATION NO.: 1993

NAME OF SUBSTANCE:
FLAMMABLE LIQUID, NOS (ACETONE, TETRAHYDROFURAN, METHYL ETHYL KETONE, CYCLOHEXANONE)

HAZARD IDENTIFICATION NO. (DESCRIPTION): 33

LABEL: FLAMMABLE LIQUID

CLASS AND ITEM NUMBER: 3, 5o, (C)

15. REGULATORY INFORMATION

ADDITIONAL UNITED STATES REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS:
THE COMPONENTS OF THIS PRODUCT ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTIONS 302, 304, AND 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT, AND ARE LISTED AS FOLLOWS:

CHEMICAL NAME	SARA 302 (40 CFR 355, APPENDIX A)	SARA 304 (40 CFR TABLE 302.4)	SARA 313 (40 CFR 372.65)
ACETONE	NO	YES	NO
CYCLOHEXANONE	NO	YES	YES
METHYL ETHYL KETONE	NO	YES	YES
TETRAHYDROFURAN	NO	YES	NO

U.S. SARA THRESHOLD PLANNING QUANTITY: NOT APPLICABLE.

U.S. CERCLA REPORTABLE QUANTITY (RQ):
CYCLOHEXANONE: 5000 LB.
METHYL ETHYL KETONE: 5000 LB.
TETRAHYDROFURAN: 1000 LB.
ACETONE: 5000 LB

U.S. TSCA INVENTORY STATUS:
THE COMPONENTS OF THIS PRODUCT ARE LISTED ON THE TSCA INVENTORY.

OTHER U.S. FEDERAL REGULATIONS: NOT APPLICABLE.

U.S. STATE REGULATORY INFORMATION:
COMPONENTS OF THIS PRODUCT ARE COVERED UNDER SPECIFIC STATE REGULATIONS, AS DENOTED BELOW:

ALASKA - DESIGNATED TOXIC AND HAZARDOUS SUBSTANCES:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

CALIFORNIA - PERMISSIBLE EXPOSURE LIMITS FOR CHEMICAL CONTAMINANTS:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

FLORIDA - SUBSTANCE LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

ILLINOIS - TOXIC SUBSTANCE LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

KANSAS - SECTION 302/313 LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

MASSACHUSETTS - SUBSTANCE LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

MICHIGAN - CRITICAL MATERIALS REGISTER: NO.

MINNESOTA - LIST OF HAZARDOUS SUBSTANCES:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

MISSOURI - EMPLOYER INFORMATION/TOXIC SUBSTANCE LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

NEW JERSEY - RIGHT TO KNOW HAZARDOUS SUBSTANCE LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

NORTH DAKOTA - LIST OF HAZARDOUS CHEMICALS, REPORTABLE QUANTITIES:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

PENNSYLVANIA - HAZARDOUS SUBSTANCE LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

RHODE ISLAND - HAZARDOUS SUBSTANCE LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

TEXAS - HAZARDOUS SUBSTANCE LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

WEST VIRGINIA - HAZARDOUS SUBSTANCE LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

WISCONSIN - TOXIC AND HAZARDOUS SUBSTANCES:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

CALIFORNIA, SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65):
THIS PRODUCT MAY CONTAIN TRACE CONSTITUENTS, SUCH AS VINYL CHLORIDE, PRESENT IN ONE OF THE PRODUCT'S COMPONENTS. UNDER COMMON USAGE, EXPOSURES TO THESE TRACE CONSTITUENTS AT LEVELS EXCEEDING THE "NO SIGNIFICANT RISK LEVEL" (NSRL) WOULD NOT OCCUR. USERS ARE EXPECTED TO FOLLOW NORMAL PPE AND VENTILATION GUIDELINES SUCH AS THOSE IN SECTION 8 AND OTHER PORTIONS OF THIS MSDS.

VOC INFORMATION:
THIS PRODUCT EMITS VOLATILE ORGANIC COMPOUNDS (VOC'S) DURING USE AND CURE. USERS SHOULD DETERMINE IF LOCAL REGULATIONS REGARDING USE OF VOC CONTAINING PRODUCTS EXIST IN THEIR AREA AND IF THIS PRODUCT COMPLIES.

ANSI STANDARD LABELING (Z129.1):

DANGER!
EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. MAY BE HARMFUL IF INHALED. MAY CAUSE CENTRAL NERVOUS SYSTEM EFFECTS. MAY CAUSE SKIN AND EYE IRRITATION. ASPIRATION HAZARD - CAN CAUSE LIFE-THREATENING LUNG DAMAGE IF SWALLOWED. MAY CAUSE REPRODUCTIVE EFFECTS, BASED ON ANIMAL TESTS. KEEP AWAY FROM HEAT, SPARKS, AND FLAME. AVOID BREATHING VAPOR OR MISTS. AVOID CONTACT WITH SKIN OR CLOTHING. USE ONLY WITH ADEQUATE VENTILATION. KEEP CONTAINER CLOSED. WASH THOROUGHLY AFTER HANDLING. THE RECOMMENDED STORAGE TEMPERATURE IS 21-32 DEG. C (70-90 DEG. F). RECOMMENDED MAXIMUM SHELF-LIFE FOR UNOPENED CONTAINERS IS 2 YEARS.

FIRST AID:
IN CASE OF CONTACT, IMMEDIATELY FLUSH SKIN OR EYES FOR AT LEAST 15 MINUTES. IF INHALED, MOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF FIRE:
USE FOG, FOAM, DRY CHEMICAL OR CO2. LIQUID WILL FLOAT AND MAY RE-IGNITE ON THE SURFACE OF WATER.

IN CASE OF SPILL:
ABSORB SPILL WITH INERT MATERIAL (E.G. ACTIVATED CARBON) THEN PLACE IN SUITABLE CONTAINER. REFER TO MATERIAL SAFETY DATA SHEET FOR ADDITIONAL INFORMATION ON THIS PRODUCT.

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS:
THE COMPONENTS OF THIS PRODUCT ARE ON THE DSL INVENTORY.

OTHER CANADIAN REGULATIONS: NOT APPLICABLE.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LIST:
THE COMPONENTS OF THIS PRODUCT ARE NOT ON THE CEPA PRIORITIES SUBSTANCES LIST.

CANADIAN WHMIS SYMBOLS:
CLASS B2: FLAMMABLE LIQUID
CLASS D2A/B: MATERIALS CAUSING OTHER TOXIC EFFECTS

EUROPEAN COMMUNITY INFORMATION:

EUROPEAN COMMUNITY INFORMATION FOR PRODUCT:

EC LABELING AND CLASSIFICATION:
BASED ON THE INFORMATION ON THE PRODUCT'S COMPONENTS AND AN ASSESSMENT OF THE PHYSICAL AND HEALTH HAZARDS ASSOCIATED WITH THE MATERIAL, THE FOLLOWING ASSIGNMENTS HAVE BEEN MADE (PER COUNCIL DIRECTIVE 67/548/EEC)

EC CLASSIFICATION: HIGHLY FLAMMABLE. IRRITANT. (F; Xi)

EC RISK PHRASES:
HIGHLY FLAMMABLE. MAY FORM EXPLOSIVE PEROXIDES. IRRITATING TO EYES AND RESPIRATORY SYSTEM. (R: 11-19-36/37)

EC SAFETY PHRASES:
KEEP OUT OF REACH OF CHILDREN. * KEEP AWAY FROM SOURCES OF IGNITION - NO SMOKING. DO NOT EMPTY INTO DRAINS. DO NOT BREATHE VAPORS. AVOID CONTACT WITH THE EYES. TAKE PRECAUTIONARY MEASURES AGAINST STATIC DISCHARGES. (S: (2) * 16-23-25-29-33) * THIS SAFETY PHRASE CAN BE OMITTED FROM THE LABEL WHEN THE SUBSTANCE OR PREPARATION IS SOLD FOR INDUSTRIAL USE ONLY.

EUROPEAN COMMUNITY ANNEX II HAZARD SYMBOLS:
(SYMBOL)
(SYMBOL)

EUROPEAN COMMUNITY INFORMATION FOR CONSTITUENTS:
THE FOLLOWING INFORMATION IS AVAILABLE FOR PRIMARY CONSTITUENTS IN THE COMPONENTS OF THIS PRODUCT.

ACETONE:

EC CLASSIFICATION: HIGHLY FLAMMABLE. (F)

EC RISK PHRASES: HIGHLY FLAMMABLE. (R: 11)

EC SAFETY PHRASES:
KEEP OUT OF REACH OF CHILDREN.* KEEP CONTAINER IN A WELL-VENTILATED PLACE. KEEP AWAY FROM SOURCES OF IGNITION. NO SMOKING. DO NOT BREATHE VAPORS. (S: (2-)*9-16-23-33).

EC COMMENTS:
*THIS SAFETY PHRASE CAN BE OMITTED FROM THE LABEL WHEN THE SUBSTANCE OR PREPARATION IS SOLD FOR INDUSTRIAL USE ONLY.

CYCLOHEXANONE:

EC CLASSIFICATION: FLAMMABLE. HARMFUL. (F; Xn)

EC RISK PHRASES: FLAMMABLE. HARMFUL BY INHALATION. (R: 10-20).

EC SAFETY PHRASES:
KEEP OUT OF REACH OF CHILDREN.* AVOID CONTACT WITH THE EYES. (S: (2-)*25).
*THIS SAFETY PHRASE CAN BE OMITTED FROM THE LABEL WHEN THE SUBSTANCE OR PREPARATION IS SOLD FOR INDUSTRIAL USE ONLY.

EC COMMENTS:
CONCENTRATION GREATER THAN OR EQUAL TO 25%:
HARMFUL. HARMFUL BY INHALATION. (Xn; R20). THIS PRODUCT CONTAINS LESS THAN THIS CONCENTRATION; THEREFORE, THIS RISK HAS BEEN OMITTED.

METHYL ETHYL KETONE:

EC CLASSIFICATION: HIGHLY FLAMMABLE. IRRITANT. (F; Xi)

EC RISK PHRASES:
HIGHLY FLAMMABLE. IRRITATING TO THE EYES AND RESPIRATORY SYSTEM. (R: 11-36/37).

EC SAFETY PHRASES:
KEEP OUT OF REACH OF CHILDREN.* KEEP CONTAINER IN A WELL-VENTILATED PLACE. KEEP AWAY FROM SOURCES OF IGNITION. NO SMOKING. AVOID CONTACT WITH THE EYES. TAKE PRECAUTIONARY MEASURES AGAINST STATIC DISCHARGES. (S: (2-)*9-16-25-33).

EC COMMENTS:
*THIS SAFETY PHRASE CAN BE OMITTED FROM THE LABEL WHEN THE SUBSTANCE OR PREPARATION IS SOLD FOR INDUSTRIAL USE ONLY.

POLYVINYL CHLORIDE:

AN OFFICIAL CLASSIFICATION FOR THIS SUBSTANCE HAS NOT BEEN PUBLISHED IN COMMISSION DIRECTIVES 93/72/EEC, 94/69/EC, AND 96/54/EC.

SILICON DIOXIDE:
AN OFFICIAL CLASSIFICATION FOR THIS SUBSTANCE HAS NOT BEEN PUBLISHED IN COMMISSION DIRECTIVES 93/72/EEC, 94/69/EC, AND 96/54/EC.

TETRAHYDROFURAN:

EC CLASSIFICATION: HIGHLY FLAMMABLE. IRRITANT. (F; Xi)

EC RISK PHRASES:
HIGHLY FLAMMABLE. MAY FORM EXPLOSIVE PEROXIDES. IRRITATING TO EYES AND RESPIRATORY SYSTEM. (R: 11-19-36/37)

EC SAFETY PHRASES:
KEEP OUT OF REACH OF CHILDREN.* KEEP AWAY FROM SOURCES OF IGNITION - NO SMOKING. DO NOT EMPTY INTO DRAINS. TAKE PRECAUTIONARY MEASURES AGAINST STATIC DISCHARGES. (S: (2-)*16-29-33) *THIS SAFETY PHRASE CAN BE OMITTED FROM THE LABEL WHEN THE SUBSTANCE OR PREPARATION IS SOLD FOR INDUSTRIAL USE ONLY.

EC COMMENTS:

CONCENTRATIONS GREATER THAN OR EQUAL TO 25 PERCENT:
IRRITANT. IRRITATING TO EYES AND RESPIRATORY SYSTEM. (Xi; R36/37)

16. OTHER INFORMATION

PREPARED BY:
CHEMICAL SAFETY ASSOCIATES, INC.
9163 CHESAPEAKE DRIVE
SAN DIEGO, CA 92123-1002
619/565-0302

EDITED/UPDATED BY: MICHAEL CUDAHY, TECHNICAL MANAGER, COOKSON ELECTRONICS

DATE OF PRINTING: JULY 13, 2004

ITEM: 5E528 - Cement 8 Oz Gray PVC Heavy Duty Lo

MSDS: B5954 **ORDER: 0074131139** **LP NUMBER: UCN9094839**

MATERIAL SAFETY DATA SHEET (MSDS)

This MSDS should be attached or kept with the respective product with which it is associated.

##

MATERIAL SAFETY DATA SHEET - B5954

Associated Grainger Items
5E525, 5E526, 5E527, 5E528, 5E529, 5E530, 5E531, 3NZD6, 3NZD5

E-Z WELD(R*)

MATERIAL SAFETY DATA SHEET

PREPARED TO U.S. OSHA, CMA, ANSI AND CANADIAN WHMIS, AND EUROPEAN COMMUNITY STANDARDS

PART I: WHAT IS THE MATERIAL AND WHAT DO I NEED TO KNOW IN AN EMERGENCY?

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED):

LOW VOC PVC SOLVENT CEMENTS:
902 EZ-1
903 POOL PRO
904 HD CLEAR
905 PVC CLEAR
906 HD GRAY
920 TRANSITION
922 WET WELD

CHEMICAL NAME/CLASS: POLYVINYL CHLORIDE / SOLVENT MIXTURE

PRODUCT USE: SOLVENT CEMENT FOR PVC-BASED MATERIAL

SUPPLIER/MANUFACTURER'S NAME: E-Z WELD, INC

U.S. ADDRESS:
1661 OLD DIXIE HIGHWAY
RIVIERA BEACH, FL 33404

U.S. BUSINESS PHONE:
1-800-327-8460
1-561-844-0241

U.S. EMERGENCY PHONE:

CHEMTREC:
1-800-424-9300 (U.S. AND CANADA)
1-703-527-3887 (INTERNATIONAL)

DATE OF PREPARATION: NOVEMBER 12 2008

2. COMPOSITION AND INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	EINECS #	% W/W
TETRAHYDROFURAN	109-99-9	203-726-8	40-60
METHYL ETHYL KETONE	78-93-3	201-159-0	1-12
POLYVINYL CHLORIDE RESIN	9002-86-2	206-625-7	<25
CYCLOHEXANONE	108-94-1	203-631-1	8-18
ACETONE	67-64-1	200-662-2	5-20
SILICON DIOXIDE (EXPOSURE LIMITS ARE FOR SILICA-AMORPHOUS DIATOMACEOUS EARTH)	112945-52-5	UNLISTED	BALANCE

CHEMICAL NAME	EXPOSURE LIMITS IN AIR ACGIH TLV PPM	ACGIH STEL PPM	OSHA PEL PPM	OSHA STEL PPM	IDLH PPM	OTHER
TETRAHYDROFURAN	50	100	200	250	2000	NIOSH REL:
	A3 (CONFIRMED			(VACATED 1989 PEL)	(BASED ON LEL)	TWA = 200
	ANIMAL					STEL = 250
	CARCINOGEN					DFG MAK: 50
	WITH UNKNOWN RELEVANCE TO HUMANS)					
METHYL ETHYL KETONE	200	300	200	300 (VACATED 1989 PEL)	3000	NIOSH REL: TWA = 200 STEL = 300
						DFG MAK: 200
CARCINOGEN:						EPA-D
POLYVINYL CHLORIDE RESIN	NE	NE	NE	NE	NE	CARCINOGEN: IARC-3
CYCLOHEXANONE	25, SKIN,	NE	50	NE	700	NIOSH REL:
	A3		25			TWA = 25,
	(CONFIRMED		(VACATED			SKIN
	ANIMAL		1989 PEL)			DFG MAK:
	CARCINOGEN					DANGER
	WITH					
	CUTANEOUS					
	ABSORPTION					
	CARCINOGEN:					
	TO HUMANS)					IARC-3; MAK-B
ACETONE	500 A4	750	1000	NE	2500	NIOSH REL:
	(NOT		750	1000		TWA = 250
	CLASSIFIABLE					DFG MAK: 500
	AS A HUMAN					
	CARCINOGEN)					
CARCINOGEN:						EPA-D
SILICON DIOXIDE (EXPOSURE LIMITS ARE FOR SILICA-AMORPHOUS DIATOMACEOUS EARTH)	FOR CAS # 61790-53-2 (UNCALCINED) 10 MG/M3 (INHALABLE PARTICULATE) 3 MG/M3 (RESPIRABLE PARTICULATE)	NE	20 MPPCF OR 80 MG/M3/ % SiO2 6 MG/M3 (VACATED 1989 PEL)		3000 MG/M3	NIOSH REL: 6 MG/M3 DFG MAK: 4 MG/M3 (CAS # 61790-53-2)
CARCINOGEN:						IARC-3 (CAS # 61790-53-2)

NE = NOT ESTABLISHED.
C = CEILING LIMIT.

SEE ORIGINAL MSDS FOR DEFINITIONS OF TERMS USED.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW:
THIS IS AN EXTREMELY FLAMMABLE LIQUID WITH AN ETHER-LIKE ODOR. THIS PRODUCT COMES IN A VARIETY OF COLORS. INHALATION OVEREXPOSURES TO THE VAPORS OF THIS PRODUCT CAN CAUSE CENTRAL-NERVOUS SYSTEM EFFECTS (E.G., DIZZINESS, DROWSINESS, NAUSEA, AND HEADACHES). THIS PRODUCT CAN BE MILDLY TO SEVERELY IRRITATING TO THE EYES, SKIN, AND OTHER CONTAMINATED TISSUE. VAPORS OF THIS PRODUCT ARE HEAVIER THAN AIR AND MAY TRAVEL TO A SOURCE OF IGNITION AND FLASHBACK TO A LEAK OR OPEN CONTAINER. TETRAHYDROFURAN, A COMPONENT OF THIS PRODUCT, IS KNOWN TO FORM EXPLOSIVE PEROXIDES UNDER CERTAIN CIRCUMSTANCES. EMERGENCY RESPONDERS MUST WEAR THE PROPER PERSONAL PROTECTIVE EQUIPMENT (AND HAVE APPROPRIATE FIRE PROTECTION) SUITABLE FOR THE SITUATION TO WHICH THEY ARE RESPONDING.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE:
THE MOST SIGNIFICANT ROUTES OF OCCUPATIONAL OVEREXPOSURE ARE INHALATION AND CONTACT WITH SKIN AND EYES.

THE SYMPTOMS OF OVEREXPOSURE TO THIS PRODUCT, VIA ROUTE OF EXPOSURE, ARE AS FOLLOWS:

INHALATION:
INHALATION OF VAPORS, MISTS, OR SPRAYS OF THIS PRODUCT CAN BE IRRITATING TO THE NOSE, THROAT, MUCOUS MEMBRANES, AND OTHER TISSUES OF THE RESPIRATORY SYSTEM. SYMPTOMS OF OVEREXPOSURE CAN INCLUDE COUGHING, SNEEZING, AND SHORTNESS OF BREATH. ADDITIONALLY, THE COMPONENTS OF THIS PRODUCT ARE CENTRAL NERVOUS SYSTEM DEPRESSANTS. SYMPTOMS OF OVER-EXPOSURE CAN INCLUDE DROWSINESS, DIZZINESS, FATIGUE, HEADACHE, NAUSEA, AND GENERAL ANESTHETIC EFFECTS. INHALATION OF HIGH CONCENTRATIONS OF THIS PRODUCT (AS MAY OCCUR IN A POORLY-VENTILATED AREA) MAY BE FATAL. BASED ON CLINICAL STUDIES INVOLVING TEST ANIMALS, CYCLOHEXANONE AND TETRAHYDROFURAN, COMPONENTS OF THIS PRODUCT, MAY CAUSE LIVER AND KIDNEY DAMAGE AFTER LONG-TERM INHALATION OVEREXPOSURES.

THIS PRODUCT MUST BE USED WITH ADEQUATE VENTILATION. MECHANICAL EXHAUST MAY BE NEEDED. ENSURE EXPOSURE TO VAPORS IS MINIMIZED BY USE OF APPROPRIATE ENGINEERING CONTROLS, WORK PRACTICES, AND PERSONAL PROTECTIVE EQUIPMENT, AS DESCRIBED IN THE REMAINDER OF THIS DOCUMENT.

CONTACT WITH SKIN OR EYES:
CONTACT WITH THIS PRODUCT CAN BE IRRITATING TO CONTAMINATED SKIN AND EYES. VAPORS OF THIS PRODUCT CAN REDDEN AND IRRITATE THE EYES. IF THE EYES ARE CONTAMINATED WITH SPLASHES, SPRAYS OR MISTS OF THIS PRODUCT, REDDENING, TEARING, AND CORNEAL OPACITY CAN OCCUR. THE LIQUID CAN BE MILDLY TO SEVERELY IRRITATING TO CONTAMINATED SKIN (DEPENDING ON DURATION OF EXPOSURE). PROLONGED
OR REPEATED SKIN OVER-EXPOSURES CAN LEAD TO DERMATITIS.

SKIN ABSORPTION:
SKIN ABSORPTION IS A POTENTIAL ROUTE OF OVEREXPOSURE FOR CYCLOHEXANONE (A COMPONENT OF THIS PRODUCT). SYMPTOMS OF SUCH EXPOSURE CAN INCLUDE THOSE DESCRIBED UNDER "INHALATION" AND "CONTACT WITH SKIN AND EYES".

INGESTION:
INGESTION IS NOT ANTICIPATED TO BE A SIGNIFICANT ROUTE OF OCCUPATIONAL OVEREXPOSURE FOR THIS PRODUCT. IF INGESTION OCCURS, REFER TO SECTION 4 (FIRST-AID MEASURES) AND GET MEDICAL HELP IMMEDIATELY. IF INGESTION OF THIS PRODUCT DOES OCCUR, SYMPTOMS OF SUCH OVER-EXPOSURE CAN INCLUDE NAUSEA, VOMITING, AND OTHER SYMPTOMS DESCRIBED FOR "INHALATION". INGESTION CAN ALSO LEAD TO LIVER AND KIDNEY DAMAGE. INGESTION OF THIS PRODUCT MAY BE FATAL.

INJECTION:
INJECTION IS NOT ANTICIPATED TO BE A SIGNIFICANT ROUTE OF OVER-EXPOSURE FOR THIS PRODUCT. IF INJECTION DOES OCCUR (I.E. THROUGH A PUNCTURE BY AN OBJECT CONTAMINATED WITH THE PRODUCT), LOCAL IRRITATION AND SWELLING CAN OCCUR. ADDITIONAL SYMPTOMS MAY INCLUDE THOSE DESCRIBED FOR "INHALATION".

HEALTH EFFECTS OR RISKS FROM EXPOSURE: AN EXPLANATION IN LAY TERMS.

ACUTE:
OVER-EXPOSURES TO THIS PRODUCT CAN BE IRRITATING TO THE EYES, SKIN, AND MUCOUS
MEMBRANES, AND CAN ALSO CAUSE CENTRAL-NERVOUS SYSTEM EFFECTS (DIZZINESS, DROWSINESS, NAUSEA AND HEADACHES). INGESTION OF THIS PRODUCT, OR INHALATION OF
HIGH CONCENTRATIONS OF THIS PRODUCT'S VAPORS, MAY BE FATAL.

CHRONIC:
PROLONGED OR REPEATED SKIN EXPOSURES CAN LEAD TO DERMATITIS (DRYNESS, REDDENING
AND IRRITATION OF THE SKIN). TETRAHYDROFURAN, A COMPONENT OF THIS PRODUCT, MAY
CAUSE LIVER AND KIDNEY DAMAGE AFTER LONG-TERM INHALATION OVEREXPOSURES. THERE IS LIMITED EVIDENCE FROM ANIMAL STUDIES THAT METHYL ETHYL KETONE, A COMPONENT OF THIS PRODUCT, IS A REPRODUCTIVE TOXIN. REFER TO SECTION 11 (TOXICOLOGICAL INFORMATION) FOR ADDITIONAL INFORMATION. A REPORT FROM THE NATIONAL TOXICOLOGY PROGRAM (NTP) HAS SUGGESTED THAT EXPOSURE OF MICE AND RATS
TO TETRAHYDROFURAN (THF) VAPOR LEVELS UP TO 1800 PPM 6 HR/DAY, 5 DAYS/WEEK FOR
THEIR LIFETIMES CAUSED AN INCREASED INCIDENCE OF KIDNEY TUMORS IN MALE RATS AND
LIVER TUMORS IN FEMALE MICE. NO EVIDENCE OF TUMORS WAS SEEN IN FEMALE RATS OR
MALE MICE. THE SIGNIFICANCE OF THESE FINDINGS FOR HUMAN HEALTH IS UNCLEAR AT THIS TIME, AND MAY BE RELATED TO "SPECIES SPECIFIC" EFFECTS. ELEVATED INCIDENCES OF TUMORS IN HUMANS HAVE NOT BEEN REPORTED FOR THF. THE NTP, IARC,
OR OSHA DOES NOT LIST THF AS A CARCINOGEN. ONE THF VENDOR (DU PONT) HAS RECOMMENDED A REDUCTION IN THE "ACCEPTABLE EXPOSURE LIMIT" FROM 200 PPM TO 25
PPM, 8 AND 12 HOUR TIME WEIGHTED AVERAGE AND A STEL OF 75 PPM.

TARGET ORGANS:
ACUTE: SKIN, EYES, RESPIRATORY SYSTEM, CENTRAL NERVOUS SYSTEM.
CHRONIC: LIVER, KIDNEYS.

HAZARDOUS MATERIAL INFORMATION SYSTEM:
HEALTH (BLUE) 2
FLAMMABILITY (RED) 3
REACTIVITY (YELLOW) 1
PROTECTIVE EQUIPMENT C/D

EYES: SAFETY GLASSES

RESPIRATORY: SEE SECTION 8

HANDS: GLOVES

BODY: APRON

FOR ROUTINE APPLICATIONS.

SEE ORIGINAL MSDS FOR DEFINITION OF RATINGS

PART II: WHAT SHOULD I DO IF A HAZARDOUS SITUATION OCCURS?

4. FIRST-AID MEASURES

SKIN EXPOSURE:
IF THIS PRODUCT CONTAMINATES THE SKIN, IMMEDIATELY BEGIN DECONTAMINATION WITH
RUNNING WATER. MINIMUM FLUSHING IS FOR 15 MINUTES. REMOVE EXPOSED OR CONTAMINATED CLOTHING, TAKING CARE NOT TO CONTAMINATE EYES. THE CONTAMINATED INDIVIDUAL MUST SEEK MEDICAL ATTENTION IF ANY ADVERSE EFFECT OCCURS.

EYE EXPOSURE:
IF THIS PRODUCT'S LIQUID OR VAPORS ENTER THE EYES, OPEN VICTIM'S EYES WHILE UNDER GENTLY RUNNING WATER. USE SUFFICIENT FORCE TO OPEN EYELIDS. HAVE VICTIM
"ROLL" EYES. MINIMUM FLUSHING IS FOR 15 MINUTES. THE CONTAMINATED INDIVIDUAL MUST SEEK IMMEDIATE MEDICAL ATTENTION.

INHALATION:
IF VAPORS, MISTS, OR SPRAYS OF THIS PRODUCT ARE INHALED, REMOVE VICTIM TO FRESH
AIR. IF NECESSARY, USE ARTIFICIAL RESPIRATION TO SUPPORT VITAL FUNCTIONS. REMOVE OR COVER GROSS CONTAMINATION TO AVOID EXPOSURE TO RESCUERS.

INGESTION:
IF THIS PRODUCT IS SWALLOWED, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST
CURRENT INFORMATION. IF PROFESSIONAL ADVICE IS NOT AVAILABLE, DO NOT INDUCE VOMITING. THE CONTAMINATED INDIVIDUAL SHOULD DRINK MILK, EGG WHITES, OR LARGE
QUANTITIES OF WATER. NEVER INDUCE VOMITING OR GIVE DILUENTS (MILK OR WATER) TO
SOMEONE WHO IS UNCONSCIOUS, HAVING CONVULSIONS, OR UNABLE TO SWALLOW.

THE CONTAMINATED INDIVIDUAL MUST BE TAKEN FOR MEDICAL ATTENTION, ESPECIALLY IF
ANY ADVERSE EFFECT OCCURS. RESCUERS SHOULD BE TAKEN FOR MEDICAL ATTENTION, IF
NECESSARY. TAKE A COPY OF LABEL AND MSDS TO HEALTH PROFESSIONAL WITH VICTIM.

5. FIRE-FIGHTING MEASURES

THE FOLLOWING INFORMATION IS VARIABLE, DEPENDING ON THE BLEND. THE FOLLOWING INFORMATION IS FOR TETRAHYDROFURAN, THE MAIN SOLVENT COMPONENT OF THIS PRODUCT.

FLASH POINT: -17 DEG. C (4.1 DEG. F)

AUTOIGNITION TEMPERATURE: 321 DEG. C (610 DEG. F)

FLAMMABLE LIMITS (IN AIR BY VOLUME):
LOWER (LEL): 1.8%
UPPER (UEL): 11.8%

THE FOLLOWING INFORMATION IS FOR THE PRODUCT.

FIRE EXTINGUISHING MATERIALS:
WATER SPRAY: YES (FOR COOLING ONLY)
CARBON DIOXIDE: YES
FOAM: YES
DRY CHEMICAL: YES
HALON: YES
OTHER: ANY "B" CLASS

UNUSUAL FIRE AND EXPLOSION HAZARDS:
THIS IS A CLASS I-B FLAMMABLE LIQUID. WHEN INVOLVED IN A FIRE, THIS MATERIAL MAY IGNITE AND PRODUCE IRRITATING VAPORS AND TOXIC GASES (E.G., CARBON MONOXIDE, CARBON DIOXIDE). THIS MATERIAL WILL READILY IGNITE AT ROOM TEMPERATURE. THE VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL TO A SOURCE OF IGNITION, AND FLASH BACK TO A LEAK OR OPEN CONTAINER. TETRAHYDROFURAN CAN FORM
POTENTIALLY EXPLOSIVE PEROXIDES; CLOSED CONTAINERS CONTAMINATED WITH PEROXIDES
CAN RUPTURE VIOLENTLY IN THE HEAT OF A FIRE.

EXPLOSION SENSITIVITY TO MECHANICAL IMPACT: NOT SENSITIVE.

EXPLOSION SENSITIVITY TO STATIC DISCHARGE:
THE VAPORS OF THIS PRODUCT CAN BE IGNITED BY STATIC ELECTRICAL ENERGY.

SPECIAL FIRE-FIGHTING PROCEDURES:
INCIPIENT FIRE RESPONDERS SHOULD WEAR EYE PROTECTION. STRUCTURAL FIREFIGHTERS
MUST WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE EQUIPMENT. IF
IT IS SAFE TO DO SO, ALLOW SMALL FIRES INVOLVING THIS PRODUCT TO BURN-OUT, WHILE PROTECTING EXPOSURES. IF POSSIBLE, PREVENT RUNOFF WATER FROM ENTERING STORM DRAINS, BODIES OF WATER, OR OTHER ENVIRONMENTALLY SENSITIVE AREAS. IF NECESSARY, RINSE CONTAMINATED EQUIPMENT THOROUGHLY BEFORE RETURNING SUCH EQUIPMENT TO SERVICE.

NFPA RATING:
HEALTH 2
FLAMMABILITY 3
REACTIVITY 1
OTHER

SEE ORIGINAL MSDS FOR DEFINITION OF RATINGS

6. ACCIDENTAL RELEASE MEASURES

RELEASE RESPONSE:
IN CASE OF A SPILL, CLEAR THE AFFECTED AREA AND PROTECT PEOPLE. UNCONTROLLED RELEASES SHOULD BE RESPONDED TO BY TRAINED PERSONNEL USING PRE-PLANNED PROCEDURES. PROPER PROTECTIVE EQUIPMENT SHOULD BE USED.

SMALL RELEASES (E.G., 1-PINT) MUST BE CLEANED-UP BY PERSONNEL WEARING GLOVES,
GOGGLES, AND APPROPRIATE EYE PROTECTION. FACE SHIELDS MUST BE WORN IF SPLASHES
OR SPRAYS OF THIS PRODUCT MAY BE GENERATED. IN THE EVENT OF A NON-INCIDENTAL RELEASE (E.G., FIVE, 1-GALLON CONTAINERS LEAKING SIMULTANEOUSLY IN A POORLY-VENTILATED AREA), THE MINIMUM PERSONAL PROTECTIVE EQUIPMENT SHOULD BE LEVEL B:
TRIPLE-GLOVES (RUBBER GLOVES AND NITRILE GLOVES, OVER LATEX GLOVES), CHEMICALLY
RESISTANT SUIT AND BOOTS, HARD-HAT, AND SELF-CONTAINED BREATHING APPARATUS. LEVEL B SHOULD ALWAYS BE USED DURING RESPONSES IN WHICH THE OXYGEN LEVEL IS BELOW 19.5% OR UNKNOWN.

ELIMINATE ALL SOURCES OF IGNITION BEFORE SPILL CLEAN-UP BEGINS. USE NON-SPARKING TOOLS. ABSORB SPILLED LIQUID WITH ACTIVATED CARBON, POLYPADS OR OTHER SUITABLE ABSORBENT MATERIALS. MONITOR THE AREA FOR COMBUSTIBLE VAPORS AND
THE LEVEL OF OXYGEN.

MONITORING MUST INDICATE LESS THAN 10 % OF THE LEL (SEE SECTION 5, FIRE-FIGHTING MEASURES) AND GREATER THAN 19.5% OXYGEN IS IN THE ATMOSPHERE BEFORE PERSONNEL ARE PERMITTED IN THE AREA WITHOUT LEVEL B PROTECTION. PLACE ALL SPILL RESIDUE IN AN APPROPRIATE CONTAINER AND SEAL. DISPOSE OF IN ACCORDANCE WITH U.S. FEDERAL, STATE, OR LOCAL PROCEDURES, THE APPLICABLE STANDARDS OF CANADA AND ITS PROVINCES, OR THE APPROPRIATE REQUIREMENTS OF EUROPEAN COMMUNITY MEMBER STATES (SEE SECTION 13, DISPOSAL CONSIDERATIONS).

PART III: HOW CAN I PREVENT HAZARDOUS SITUATIONS FROM OCCURRING?

7. HANDLING AND STORAGE

WORK PRACTICES AND HYGIENE PRACTICES:
AS WITH ALL CHEMICALS, AVOID GETTING THIS PRODUCT ON YOU OR IN YOU.

WASH THOROUGHLY AFTER HANDLING THIS PRODUCT. DO NOT EAT, DRINK, SMOKE, OR APPLY
COSMETICS WHILE HANDLING THIS PRODUCT. AVOID BREATHING VAPORS OR MISTS GENERATED BY THIS PRODUCT. REMOVE CONTAMINATED CLOTHING IMMEDIATELY.

STORAGE AND HANDLING PRACTICES:
ALL EMPLOYEES WHO HANDLE THIS MATERIAL SHOULD BE TRAINED TO HANDLE IT SAFELY.

CONTAINERS OF THIS PRODUCT MUST BE PROPERLY LABELED. IF THIS MIXTURE IS USED IN
OTHER TYPES OF CONTAINERS, ONLY USE PORTABLE CONTAINERS APPROVED FOR FLAMMABLE
LIQUIDS. POST "NO SMOKING" SIGNS, WHERE APPROPRIATE IN STORAGE AND USE AREAS.
USE NON-SPARKING TOOLS. BOND AND GROUND DURING TRANSFER OF MATERIAL. STORE CONTAINERS OF THE PRODUCT IN A COOL, DRY LOCATION, AWAY FROM DIRECT SUNLIGHT,
SOURCES OF INTENSE HEAT, OR WHERE FREEZING IS POSSIBLE. MATERIAL SHOULD BE STORED IN SECONDARY CONTAINERS, OR IN A DIKED AREA, AS APPROPRIATE. STORE CONTAINERS AWAY FROM INCOMPATIBLE CHEMICALS. KEEP CONTAINER TIGHTLY CLOSED WHEN
NOT IN USE. STORAGE AREAS SHOULD BE MADE OF FIRE-RESISTANT MATERIALS. INSPECT
ALL INCOMING CONTAINERS BEFORE STORAGE, TO ENSURE CONTAINERS ARE PROPERLY LABELED AND NOT DAMAGED. REFER TO NFPA 30, FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE FOR ADDITIONAL INFORMATION ON STORAGE. EMPTY CONTAINERS MAY CONTAIN RESIDUAL FLAMMABLE LIQUID OR VAPORS.

THEREFORE, EMPTY CONTAINERS SHOULD BE HANDLED WITH CARE. DO NOT EXPOSE "EMPTY"
CONTAINERS TO WELDING TOUCHES, OR ANY OTHER SOURCE OF IGNITION.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS:
USE WITH ADEQUATE VENTILATION. MECHANICAL EXHAUST MAY BE NEEDED.

EMERGENCY EYE-WASH/SAFETY SHOWERS:
WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS
SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE-WASH FOUNTAIN/SAFETY SHOWER WITHIN THE WORK AREA FOR EMERGENCY USE.

RESPIRATORY PROTECTION:
RESPIRATORY PROTECTION IS NOT GENERALLY NEEDED WHEN USING THIS PRODUCT. MAINTAIN AIRBORNE CONTAMINANT CONCENTRATIONS BELOW GUIDELINES LISTED IN SECTION
2 (COMPOSITION, INFORMATION ON INGREDIENTS). IF RESPIRATORY PROTECTION IS NEEDED, USE ONLY PROTECTION AUTHORIZED IN 29 CFR 1910.134 OR APPLICABLE STATE
REGULATIONS. USE SUPPLIED AIR RESPIRATION PROTECTION IF OXYGEN LEVELS ARE BELOW
19.5% OR ARE UNKNOWN. RESPIRATORY PROTECTION GUIDELINES FOR TETRAHYDROFURAN (A
COMPONENT OF THIS PRODUCT) ARE PROVIDED ON THE FOLLOWING.

NIOSH/OSHA RECOMMENDATIONS FOR TETRAHYDROFURAN CONCENTRATIONS IN AIR:

UP TO 2000 PPM:
SUPPLIED AIR RESPIRATOR (SAR) OPERATED IN A CONTINUOUS-FLOW MODE, FULL-FACEPIECE CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S),
GAS MASK WITH ORGANIC VAPOR CANISTER, POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S), FULL-FACEPIECE SELF-CONTAINED BREATHING APPARATUS
(SCBA), OR FULL-FACEPIECE SAR.

EMERGENCY OR PLANNED ENTRY INTO UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS:
POSITIVE PRESSURE, FULL-FACEPIECE SCBA OR POSITIVE PRESSURE, FULL-FACEPIECE SAR
WITH AN AUXILIARY POSITIVE PRESSURE SCBA.

ESCAPE: GAS MASK WITH ORGANIC VAPOR CANISTER OR ESCAPE-TYPE SCBA.

NOTE:
THE IDLH CONCENTRATION FOR TETRAHYDROFURAN IS 2000 PPM. THIS VALUE IS BASED ON
THE LOWER EXPLOSIVE LIMIT (LEL). RESPIRATORY PROTECTION EQUIPMENT MAY NOT BE ADEQUATE FOR FIRE SITUATIONS.

EYE PROTECTION:
SPLASH GOGGLES OR SAFETY GLASSES. FACE SHIELD SHOULD BE WORN WHEN WORKING IN SITUATIONS IN WHICH SPLASHES OR SPRAYS CAN BE GENERATED.

HAND PROTECTION:
WEAR GLOVES FOR ROUTINE INDUSTRIAL USE TO PROTECT HANDS FROM CONTACT. FOR LONG
EXPOSURES, OR UNUSUAL CONTACT, SUCH AS SPILL CLEANUP, CHEMICAL RESISTANT GLOVES
MAY BE REQUIRED. SEE SECTION 6.

BODY PROTECTION:
USE BODY PROTECTION APPROPRIATE FOR TASK (E.G., APRON OR TYVEK SUIT).

9. PHYSICAL AND CHEMICAL PROPERTIES

FOR TETRAHYDROFURAN (THE MAIN SOLVENT COMPONENT OF THIS PRODUCT):

RELATIVE VAPOR DENSITY (AIR = 1): 2.5

SPECIFIC GRAVITY (WATER = 1): APPROXIMATELY 0.91

SOLUBILITY IN WATER @ 25 DEG. C: 30%

VAPOR PRESSURE, MM Hg @ 20 DEG. C: 129

ODOR THRESHOLD: 2.48-3.47 PPM

COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT): 0.46

EVAPORATION RATE (nBuAc = 1): 8-14.5

FREEZING/MELTING POINT: -1.8.5 DEG. C (-16 DEG. F)

BOILING POINT: 66 DEG. C (151 DEG. F)

pH: NOT ESTABLISHED.

FOR THIS PRODUCT:

ODOR THRESHOLD: NOT APPLICABLE.

COLOR: VARIABLE COLOR.

VISCOSITY: NOT AVAILABLE.

FORM: LIQUID.

ODOR: ETHEREAL.

FLASH POINT: -17 DEG. C (4.1 DEG. F) (TETRAHYDROFURAN)

HOW TO DETECT THIS SUBSTANCE (WARNING PROPERTIES):
THE COLOR AND ODOR OF THE PRODUCT MAY BE DISTINCTIVE PROPERTIES OF THIS PRODUCT.

10. STABILITY AND REACTIVITY

STABILITY: STABLE.

NOTE:
TETRAHYDROFURAN, A COMPONENT OF THIS PRODUCT, CAN FORM POTENTIALLY EXPLOSIVE PEROXIDE COMPOUNDS WHEN EXPOSED TO LIGHT OR AIR. THOUGH THIS PRODUCT CONTAINS
INHIBITORS TO PREVENT PEROXIDE FORMATION, CARE SHOULD BE USED WHEN STORING THIS
PRODUCT, OR HANDLING OLD CONTAINERS OF THIS MATERIAL.

DECOMPOSITION PRODUCTS:
CARBON MONOXIDE, CARBON DIOXIDE, SILICON AND CHLORIDE COMPOUNDS.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE:
THIS PRODUCT WILL NOT BE COMPATIBLE WITH STRONG OXIDIZERS, LITHIUM ALUMINUM HYDRIDE, AND ALKALINE EARTH HYDROXIDES.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR.

CONDITIONS TO AVOID:
AVOID EXPOSURE OR CONTACT TO EXTREME TEMPERATURES, SOURCES OF IGNITION, INCOMPATIBLE CHEMICALS.

PART IV: IS THERE ANY OTHER USEFUL INFORMATION ABOUT THIS MATERIAL?

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA:
THE SPECIFIC TOXICOLOGY DATA AVAILABLE FOR COMPONENTS GREATER THAN 1% IN CONCENTRATION ARE AS FOLLOWS.

CYCLOHEXANONE:

EYE EFFECTS-HUMAN: 75 PPM

SKIN-RABBIT, ADULT: 500 MG OPEN MILD IRRITATION EFFECTS

ORAL-RAT LD50: 1535 MG/KG

ORAL-MOUSE LD50: 1400 MG/KG

SUBCUTANEOUS-RAT LD50: 2170 MG/KG

INTRAPERITONEAL-MOUSE LD50: 1350 MG/KG

SUBCUTANEOUS-MOUSE LDLO: 1300 MG/KG

INTRAVENOUS-DOG, ADULT LDLO: 630 MG/KG

ORAL-RABBIT, ADULT LDLO: 1600 MG/KG

SKIN-RABBIT, ADULT LD50: 948 MG/KG

TCLO - INHALATION - RAT:

105 MG/M3/4 HOURS:

FEMALE 1-20 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - FERTILITY - PRE-IMPLANTATION MORTALITY

TDLO - ORAL - MOUSE:

11 GM/KG:

FEMALE 8-12 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - EFFECTS ON NEWBORN - GROWTH STATISTICS (E.G.%, REDUCED WEIGHT GAIN)

MUTATION IN MICROORGANISMS:
BACTERIA - SALMONELLA TYPHIMURIUM: 20 (MICRO)L/
MUTATION IN MICROORGANISMS - BACTERIA - BACILLUS SUBTILIS: 200 (MICRO)L/L

CYTOGENETIC ANALYSIS:
HUMAN LEUKOCYTE: 100 (MICRO)MOL/L

CYTOGENETIC ANALYSIS:
HUMAN LYMPHOCYTE: 5 (MICRO)G/L

SISTER CHROMATID EXCHANGE:
RODENT - HAMSTER OVARY: 7500 (MICRO)L/L

MUTATION IN MAMMALIAN SOMATIC:
RODENT - HAMSTER OVARY: 7500 (MICRO)L/L

METHYL ETHYL KETONE:

EYE EFFECTS-HUMAN: 350 PPM

SKIN-RABBIT, ADULT: 500 MG/24 HOURS; MODERATE IRRITATION EFFECTS

SKIN-RABBIT, ADULT: 402 MG/24 HOURS; MILD IRRITATION EFFECTS

SKIN-RABBIT, ADULT: 13,780 MG/24H OPEN MILD IRRITATION EFFECTS

EYE EFFECTS-RABBIT, ADULT: 80 MG

INTRAPERITONEAL-MOUSE LD50: 616 MG/KG

SKIN-RABBIT, ADULT LD50: 6450 MG/KG

SEX CHROMOSOME LOSS AND NONDISJUNCTION - SACCHAROMYCES CEREVISIAE: 33,800 PPM

INHALATION-RAT TCLO:
1000 PPM/(6-15D PREG): TERATOGENIC EFFECTS

INHALATION-HUMAN TCLO:

100 PPM/5 MINUTES: IRRITANT EFFECTS

ORAL-RAT LD50: 2737 MG/KG

INHALATION-RAT LC50: 23,500 MG/M3/8 HOURS

INTRAPERITONEAL-RAT LD50: 607 MG/KG

ORAL-MOUSE LD50: 4050 MG/KG

INHALATION-MOUSE LC50: 40 G/M3/2 HOURS

INTRAPERITONEAL-GUINEA PIG, ADULT LDLO: 2 G/KG

INHALATION-UNSPECIFIED EFFECTS LC50: 38 G/M3

INHALATION-RAT TCLO: 5000 PPM/6H/90 DAYS - INTERMITTENT

TDLO - SUBCUTANEOUS - CAT:

55500 MG/KG/37 WEEKS - INTERMITTENT:
REPRODUCTIVE - TUMORIGENIC EFFECTS - OTHER REPRODUCTIVE SYSTEM TUMORS

TCLO - INHALATION - RAT:

3000 PPM/7 HOURS:

FEMALE 6-15 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - SPECIFIC DEVELOPMENTAL ABNORMALITIES - CRANIOFACIAL (INCLUDING
NOSE AND TONGUE), UROGENITAL SYSTEM, HOMEOSTASIS

TCLO - INHALATION - RAT: 1000 PPM/7 HOURS:

FEMALE 6-15 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - EFFECTS ON EMBRYO OR FETUS - FETOTOXICITY (EXCEPT DEATH, E.G.,
STUNTED FETUS) REPRODUCTIVE - SPECIFIC DEVELOPMENTAL ABNORMALITIES - MUSCULOSKELETAL SYSTEM

TCLO - INHALATION - MOUSE: 3000 PPM/7H:

FEMALE 6-15 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - EFFECTS ON EMBRYO OR FETUS - FETOTOXICITY

POLYVINYL CHLORIDE RESIN:

ORAL-RAT TDLO:

210 G/KG/30 WEEKS - CONTINUOUS: EQUIVOCAL TUMORIGENIC AGENT

IMPLANT-RAT TDLO:
75 MG/KG: EQUIVOCAL TUMORIGENIC AGENT

SILICON DIOXIDE:

UNSCHEDULED DNA SYNTHESIS-RAT-INTRATRACHEAL: 120 MG/KG

BODY FLUID ASSAY-RAT: LUNG 120 MG/KG

INHALATION-RAT TCLO:

50 MG/M3/6 HOURS/2 YEARS - INTERMITTENT:

ORAL-RAT LD50: 3160 MG/KG

INTRAPERITONEAL-RAT LDLO: 50 MG/KG

INTRAVENOUS-RAT LD50: 15 MG/KG

INTRATRACHEAL-RAT LDLO: 10 MG/KG

INTRAPERITONEAL-GUINEA PIG, ADULT LDLO: 120 MG/KG

TETRAHYDROFURAN:
MUTATION IN MICROORGANISMS-ESCHERICHIA COLI: 1 (MICRO)MOL/L

INHALATION-HUMAN TCLO:

25,000 PPM: CENTRAL NERVOUS SYSTEM EFFECTS

ORAL-RAT LD50: 1650 MG/KG.

INHALATION-RAT LC50: 21,000 PPM/3H

INTRAPERITONEAL-RAT LD50: 2900 MG/KG

INHALATION-MOUSE LCLO: 24,000 MG/M3/2 HOURS

INTRAPERITONEAL-MOUSE LD50: 1900 MG/KG

INTRAPERITONEAL-GUINEA PIG, ADULT LDLO: 500 MG/KG

INHALATION-RAT TCLO: 5000 PPM/6 HOURS/91 DAYS - INTERMITTENT

TCLO - INHALATION - RAT: 5000 PPM/6H:

FEMALE 6-19 DAY(S) AFTER CONCEPTION:
REPRODUCTIVE - EFFECTS ON EMBRYO OR FETUS - FETOTOXICITY

TCLO - INHALATION - MOUSE:

1800 PPM/6H:

FEMALE 6-17 DAY(S) AFTER CONCEPTION:

REPRODUCTIVE - FERTILITY - POST-IMPLANTATION MORTALITY

MUTATION IN MICROORGANISMS:
BACTERIA - ESCHERICHIA COLI: 1 (MICRO)MOL/L

SUSPECTED CANCER AGENT:

COMPONENTS OF THIS PRODUCTS ARE LISTED AS FOLLOWS:

CYCLOHEXANONE:
IARC-3: NOT CLASSIFIABLE AS A HUMAN CARCINOGEN.
MAK-B: JUSTIFIABLY SUSPECTED OF HAVING CARCINOGENIC POTENTIAL.

POLYVINYL CHLORIDE RESIN:
IARC-3: NOT CLASSIFIABLE AS A HUMAN CARCINOGEN.

SILICON DIOXIDE:
IARC-3: NOT CLASSIFIABLE AS A HUMAN CARCINOGEN.

METHYL ETHYL KETONE:
EPA-D: NOT CLASSIFIABLE AS TO HUMAN CARCINOGENICITY.

THIS PRODUCT'S COMPONENTS ARE NOT FOUND ON THE FOLLOWING LISTS:
FEDERAL OSHA Z LIST, NTP, IARC, AND CAL/OSHA AND THEREFORE ARE NEITHER CONSIDERED TO BE NOR SUSPECTED TO BE CANCER-CAUSING AGENTS BY THESE AGENCIES.

IRRITANCY OF PRODUCT:
THIS PRODUCT IS EXPECTED TO MILDLY TO SEVERELY IRRITATE THE SKIN AND EYES.

SENSITIZATION TO THE PRODUCT:
NO COMPONENT OF THIS PRODUCT IS KNOWN TO BE A SENSITIZER WITH PROLONGED OR REPEATED USE.

REPRODUCTIVE TOXICITY INFORMATION:
LISTED BELOW IS INFORMATION CONCERNING THE EFFECTS OF THIS PRODUCT AND ITS COMPONENTS ON THE HUMAN REPRODUCTIVE SYSTEM.

MUTAGENICITY:
THIS PRODUCT IS NOT REPORTED TO PRODUCE MUTAGENIC EFFECTS IN HUMANS. HUMAN MUTATION DATA ARE AVAILABLE FOR CYCLOHEXANONE (A COMPONENT OF THIS PRODUCT); THESE DATA WERE OBTAINED ON SPECIFIC HUMAN TISSUES EXPOSED TO RELATIVELY HIGH
DOSES. ANIMAL MUTATION DATA ARE AVAILABLE FOR METHYL ETHYL KETONE, SILICON DIOXIDE, AND TETRAHYDROFURAN (COMPONENTS OF THIS PRODUCT); THESE DATA WERE OBTAINED DURING CLINICAL STUDIES ON SPECIFIC ANIMAL TISSUES OR MICRO-ORGANISMS
EXPOSED TO HIGH DOSES OF THESE COMPOUNDS.

EMBRYOTOXICITY:
THIS PRODUCT IS NOT REPORTED TO PRODUCE EMBRYOTOXIC EFFECTS IN HUMANS.

TERATOGENICITY:
THIS PRODUCT IS NOT REPORTED TO CAUSE TERATOGENIC EFFECTS IN HUMANS. THREE ANIMAL STUDIES INVOLVING METHYL ETHYL KETONE (A COMPONENT OF THIS PRODUCT) HAVE
SHOWN FETOTOXICITY (SKELETAL ANOMALIES) AT DOSES WHICH DID NOT PRODUCE SIGNIFICANT MATERNAL TOXICITY.

REPRODUCTIVE TOXICITY:
THIS PRODUCT IS NOT REPORTED TO CAUSE REPRODUCTIVE EFFECTS IN HUMANS. REPRODUCTIVE TOXICITY DATA ARE AVAILABLE FOR METHYL ETHYL KETONE AND TETRAHYDROFURAN (A COMPONENT OF THIS PRODUCT); THESE DATA WERE OBTAINED FROM CLINICAL STUDIES ON TEST ANIMALS EXPOSED TO RELATIVELY HIGH DOSES.

A MUTAGEN IS A CHEMICAL WHICH CAUSES PERMANENT CHANGES TO GENETIC MATERIAL (DNA) SUCH THAT THE CHANGES WILL PROPAGATE THROUGH GENERATIONAL LINES. AN EMBRYOTOXIN IS A CHEMICAL WHICH CAUSES DAMAGE TO A DEVELOPING EMBRYO (I.E. WITHIN THE FIRST EIGHT WEEKS OF PREGNANCY IN HUMANS), BUT THE DAMAGE DOES NOT
PROPAGATE ACROSS GENERATIONAL LINES. A TERATOGEN IS A CHEMICAL WHICH CAUSES DAMAGE TO A DEVELOPING FETUS, BUT THE DAMAGE DOES NOT PROPAGATE ACROSS GENERATIONAL LINES. A REPRODUCTIVE TOXIN IS ANY SUBSTANCE WHICH INTERFERES IN
ANY WAY WITH THE REPRODUCTIVE PROCESS.

ACGIH BIOLOGICAL EXPOSURE INDICES:

CURRENTLY, THERE ARE ACGIH BIOLOGICAL EXPOSURE INDICES (BEIS) ASSOCIATED WITH
COMPONENTS OF THIS PRODUCT, AS FOLLOWS:

CHEMICAL DETERMINANT	SAMPLING TIME	BEI
ACETONE MG/L ACETONE IN URINE	END OF SHIFT	100
METHYL ETHYL KETONE (MEK) MEK IN URINE	END OF SHIFT	2 MG/L
TETRAHYDROFURAN (INTENDED) TETRAHYDROFURAN IN URINE	END OF SHIFT	8 MG/L

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:
PREEXISTING RESPIRATORY PROBLEMS, DERMATITIS, AND OTHER SKIN DISORDERS, AS WELL
AS CONDITIONS INVOLVING THE "TARGET ORGANS" (SEE SECTION 3, HAZARD IDENTIFICATION) CAN BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT.

RECOMMENDATIONS TO PHYSICIANS:
TREAT SYMPTOMS AND ELIMINATE OVEREXPOSURE. IF NECESSARY, REVIEW FOR BRAIN AND
CENTRAL NERVOUS SYSTEM EFFECTS AND CONDUCT PULMONARY FUNCTION TEST. OTHER TESTS
FOR LUNG, KIDNEY, AND LIVER EFFECTS MAY ALSO PROVE USEFUL.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY:
THE COMPONENTS OF THIS PRODUCT WILL BIODEGRADE INTO OTHER ORGANIC COMPOUNDS.

ENVIRONMENTAL DATA ARE AVAILABLE FOR COMPONENTS OF THIS PRODUCT, AS FOLLOWS:

CYCLOHEXANONE:
KOC - 0.81. WATER SOLUBILITY 23,000 MG/L. CYCLOHEXANONE IS NOT RAPIDLY VOLATILIZED FROM WATER, EXCEPT FOR FAST MOVING STREAMS OR VERY SHALLOW PONDS.
SIGNIFICANT SOIL LEACHING OCCURS, CONTRIBUTING TO GROUND WATER CONTAMINATION.
BIODEGRADATION AND PHOTOLYSIS OCCUR IN WATER. RAPID ATMOSPHERIC DEGRADATION OCCURS VIA PHOTOLYSIS, WITH A HALF-LIFE OF ABOUT 1 TO 5 DAYS.

METHYL ETHYL KETONE:
LOG KOW = 0.29. WATER SOLUBILITY = 239,000 MG/L. METHYL ETHYL KETONE IS RAPIDLY
VOLATILIZED FROM WATER AND UNDERGOES SLOW BIODEGRADATION. IT UNDERGOES MODERATE
ATMOSPHERIC PHOTODEGRADATION.

TETRAHYDROFURAN:
WATER SOLUBILITY = 30% (25 DEG. C). TETRAHYDROFURAN IS SIGNIFICANTLY BIODEGRADED IN STANDARD TESTS. THIS COMPOUND IS NOT EXPECTED TO BIOCONCENTRATE
IN FISH SIGNIFICANTLY.

EFFECT OF MATERIAL ON PLANTS OR ANIMALS:
THIS PRODUCT CAN BE HARMFUL OR FATAL TO CONTAMINATED PLANT OR ANIMAL LIFE, ESPECIALLY IF RELEASED IN LARGE QUANTITIES INTO THE ENVIRONMENT. REFER TO SECTION 11 (TOXICOLOGICAL INFORMATION) FOR INFORMATION REGARDING THE EFFECT OF
THIS PRODUCT'S COMPONENTS ON TEST ANIMALS.

EFFECT OF CHEMICAL ON AQUATIC LIFE:
THIS PRODUCT CAN BE HARMFUL OR FATAL TO CONTAMINATED AQUATIC PLANT OR ANIMAL LIFE, ESPECIALLY IF RELEASED IN LARGE QUANTITY IN A BODY OF WATER.

THE FOLLOWING AQUATIC TOXICITY DATA ARE AVAILABLE FOR THE COMPONENTS OF THIS PRODUCT:

CYCLOHEXANONE:
LC50 (PIMEPHALES PROMELAS FATHEAD MINNOW): 527 MG/L 96 HOURS
EC0 (BACTERIA PSEUDOMONAS PUTIDA) 16 HOURS: 180 MG/L
EC0 (ALGAE MICROCYSTIS AERUGINOSA) 8 DAYS: 52 MG/L
EC0 (GREEN ALGAE SCENEDESMUS QUADRICAUDA) 7 DAYS: 370 MG/L
EC0 (PROTOZOA ENTOSIPHON SULCATUM) 72 HOURS: 545 MG/L
EC0 (PROTOZOA URONEMA PARDUCZI CHATTON-LWOFF): 280 MG/L
EC0 (BACTERIA PSEUDOMONAS FLUORESCENS) 16 HOURS: 180 MG/L (pH = 7)

EC0 (CHILOMONAS PARAMECIUM EHRENBERG) 48 HOURS: 573 MG/L
EC0 (DAPHNIA MAGNA STRAUS) 24 HOURS: 526 MG/L
EC50 (DAPHNIA MAGNA STRAUS) 24 HOURS: 820 MG/L
EC100 (DAPHNIA MAGNA STRAUS) 24 HOURS: 1,240 MG/L
EC0 (DAPHNIA MAGNA) 24 HOURS: 540 MG/L
EC50 (DAPHNIA MAGNA) 24 HOURS: 800 MG/L
EC100 (DAPHNIA MAGNA) 24 HOURS: 1,540 MG/L
LC50 (FATHEAD MINNOW) 96 HOURS: 526; 618; 630 MG/L
LC50 (LEUCISCUS IDUS) 24 HOURS: 538 MG/L
LC50 (LEUCISCUS IDUS) 96 HOURS: 536; 539; 752 MG/L

METHYL ETHYL KETONE:
EC0 (SCENEDESMUS QUADRICAUDA, GREEN ALGAE): 4300 MG/L/8 DAYS
EC0 (ENTOSIPHON SULCATUM, PROTOZOA): 190 MG/L/72 HOURS
EC0 (URONEMA PARDUCZI CHATTON-LWOFF, PROTOZOA): 2830 MG/L
EC0 (PSEUDOMONAS PUTIDA, BACTERIA): 1150 MG/L/16 HOURS
LC50 (PIMEPHALES PROMELAS, FATHEAD MINNOW): 3200 MG/L/96 HOUR
LD0 (PSEUDOMONAS, BACTERIA): 2,500 MG/L
LD0 (SCENEDESMUS, ALGAE): 12,500 MG/L
LD0 COLPODA, PROTOZOA): 5,000 MG/L
LC50 (MOSQUITO FISH): 5,600 MG/L/24 96 HOURS
LC50 (BLUEGILL): 5,640 1,690 MG/L/24 96 HOURS
LC50 (GOLDFISH): 5,000 MG/L/24 HOURS

TETRAHYDROFURAN:

GROWTH INHIBITION (MICROCYSTIS, BLUE ALGEA): 225 MG/L

TOXICITY THRESHOLD (CELL MULTIPLICATION INHIBIT SYSTEM TEST):
(URONEMA PARDUCZI CHATTON-LWOFF, PROTOZOA): 858 MG/L
(PSEUDOMONAS PUTIDA, BACTERIA): 580 MG/L
(MICROCYTIS AERUGINOSA, ALGEA): 225 MG/L

LC50 (SILVER/GOLDEN ORFE): 2820-2930 MG/L

LC50 (FATHEAD MINNOW): 2160 MG/L/96 HOURS

LC50 (CARP): 4400 MG/L/48 HOURS

LC50 (GOLDFISH): 2400 MG/L/48 HOURS

VOC INFORMATION:
THIS PRODUCT EMITS VOC'S (VOLATILE ORGANIC COMPOUNDS) IN ITS USE. MAKE SURE THAT USE OF THIS PRODUCT COMPLIES WITH LOCAL VOC EMISSION REGULATIONS, WHERE THEY EXIST.

VOC LEVEL: 510 G/L PER SCAQMD TEST METHOD 316A.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL:
WASTE DISPOSAL MUST BE IN ACCORDANCE WITH APPROPRIATE U.S. FEDERAL, STATE, AND
LOCAL REGULATIONS, THOSE OF CANADA AND ITS PROVINCES, AS WELL AS THOSE APPLICABLE TO THE EC MEMBER STATES. THIS PRODUCT, IF UNALTERED BY USE, MAY BE
DISPOSED OF BY TREATMENT AT A PERMITTED FACILITY OR AS ADVISED BY YOUR LOCAL HAZARDOUS WASTE REGULATORY AUTHORITY.

U.S. EPA WASTE NUMBER: D001 (CHARACTERISTIC/IGNITABILITY)

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME:
FLAMMABLE LIQUID, NOS (ACETONE, TETRAHYDROFURAN, METHYL ETHYL KETONE, CYCLOHEXANONE)

HAZARD CLASS NUMBER AND DESCRIPTION: 3 (FLAMMABLE LIQUID)

UN IDENTIFICATION NUMBER: UN 1993

PACKING GROUP: II

DOT LABEL(S) REQUIRED: FLAMMABLE LIQUID

NOTE:
SHIPMENTS OF CONTAINERS HOLDING 1-LITER OR LESS IN VOLUME QUALIFY FOR A "LIMITED QUANTITY" EXCEPTION. REFER TO 49 CFR 173.150 FOR ADDITIONAL INFORMATION.

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MARINE POLLUTANT:
NO COMPONENT OF THIS PRODUCT IS DESIGNATED AS A MARINE POLLUTANT BY THE DOT (PER 49 CFR 172.101, APPENDIX B).

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:
THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. USE THE ABOVE INFORMATION FOR
THE PREPARATION OF CANADIAN SHIPMENTS.

IMO DESIGNATION:
THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS BY THE INTERNATIONAL MARITIME ORGANIZATION

PROPER SHIPPING NAME:
FLAMMABLE LIQUID, NOS (ACETONE, TETRAHYDROFURAN, METHYL ETHYL KETONE, CYCLOHEXANONE)

HAZARD CLASS NUMBER AND DESCRIPTION:
3.2 (FLAMMABLE LIQUID; INTERMEDIATE FLASH POINT)

UN IDENTIFICATION NUMBER: UN 1993

PACKING GROUP: II

LABEL(S) REQUIRED: FLAMMABLE LIQUID

IMDG CODE: 3230

MARINE POLLUTANT:
THIS PRODUCT IS NOT DESIGNATED BY THE IMO TO BE A MARINE POLLUTANT.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY
ROAD (ADR):
THIS MATERIAL IS NOT CONSIDERED BY THE UNITED NATIONS ECONOMIC COMMISSION FOR
EUROPE TO BE DANGEROUS GOODS.

ADDITIONAL INFORMATION IS AS FOLLOWS:

SUBSTANCE IDENTIFICATION NO.: 1993

NAME OF SUBSTANCE:
FLAMMABLE LIQUID, NOS (ACETONE, TETRAHYDROFURAN, METHYL ETHYL KETONE, CYCLOHEXANONE)

HAZARD IDENTIFICATION NO. (DESCRIPTION): 33

LABEL: FLAMMABLE LIQUID

CLASS AND ITEM NUMBER: 3, 5 DEG. (C)

15. REGULATORY INFORMATION

ADDITIONAL UNITED STATES REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS:

THE COMPONENTS OF THIS PRODUCT ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTIONS 302, 304, AND 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT, AND ARE LISTED AS FOLLOWS:

CHEMICAL NAME	SARA 302 (40 CFR 355, APPENDIX A)	SARA 304 (40 CFR TABLE 302.4)	SARA 313 (40 CFR 372.65)
ACETONE	NO	YES	NO
CYCLOHEXANONE	NO	YES	YES
METHYL ETHYL KETONE	NO	YES	YES
TETRAHYDROFURAN	NO	YES	NO

U.S. SARA THRESHOLD PLANNING QUANTITY: NOT APPLICABLE.

U.S. CERCLA REPORTABLE QUANTITY (RQ):
CYCLOHEXANONE: 5000 LB.
METHYL ETHYL KETONE: 5000 LB.
TETRAHYDROFURAN: 1000 LB.
ACETONE: 5000 LB

U.S. TSCA INVENTORY STATUS:
THE COMPONENTS OF THIS PRODUCT ARE LISTED ON THE TSCA INVENTORY.

OTHER U.S. FEDERAL REGULATIONS: NOT APPLICABLE.

U.S. STATE REGULATORY INFORMATION:

COMPONENTS OF THIS PRODUCT ARE COVERED UNDER SPECIFIC STATE REGULATIONS, AS DENOTED BELOW:

ALASKA - DESIGNATED TOXIC AND HAZARDOUS SUBSTANCES:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

CALIFORNIA - PERMISSIBLE EXPOSURE LIMITS FOR CHEMICAL CONTAMINANTS:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

FLORIDA - SUBSTANCE LIST: CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

ILLINOIS - TOXIC SUBSTANCE LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

KANSAS - SECTION 302/313 LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

MASSACHUSETTS - SUBSTANCE LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

MICHIGAN - CRITICAL MATERIALS REGISTER: NO.

MINNESOTA - LIST OF HAZARDOUS SUBSTANCES:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

MISSOURI - EMPLOYER INFORMATION/TOXIC SUBSTANCE LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

NEW JERSEY - RIGHT TO KNOW HAZARDOUS SUBSTANCE LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

NORTH DAKOTA - LIST OF HAZARDOUS CHEMICALS, REPORTABLE QUANTITIES:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

PENNSYLVANIA - HAZARDOUS SUBSTANCE LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

RHODE ISLAND - HAZARDOUS SUBSTANCE LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

TEXAS - HAZARDOUS SUBSTANCE LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

WEST VIRGINIA - HAZARDOUS SUBSTANCE LIST:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

WISCONSIN - TOXIC AND HAZARDOUS SUBSTANCES:
CYCLOHEXANONE, METHYL ETHYL KETONE, TETRAHYDROFURAN.

CALIFORNIA, SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65):
THIS PRODUCT MAY CONTAIN TRACE CONSTITUENTS, SUCH AS VINYL CHLORIDE, PRESENT IN ONE OF THE PRODUCT'S COMPONENTS. UNDER COMMON USAGE, EXPOSURES TO THESE TRACE CONSTITUENTS AT LEVELS EXCEEDING THE "NO SIGNIFICANT RISK LEVEL" (NSRL) WOULD NOT OCCUR. USERS ARE EXPECTED TO FOLLOW NORMAL PPE AND VENTILATION GUIDELINES SUCH AS THOSE IN SECTION 8 AND OTHER PORTIONS OF THIS MSDS.

VOC INFORMATION:
THIS PRODUCT EMITS VOLATILE ORGANIC COMPOUNDS (VOC'S) DURING USE AND CURE. USERS SHOULD DETERMINE IF LOCAL REGULATIONS REGARDING USE OF VOC CONTAINING PRODUCTS EXIST IN THEIR AREA AND IF THIS PRODUCT COMPLIES. ALL PRODUCTS <510

G/L VOC AS TESTED.

ANSI STANDARD LABELING (Z129.1):

DANGER!

EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. MAY BE HARMFUL IF INHALED. MAY CAUSE CENTRAL NERVOUS SYSTEM EFFECTS. MAY CAUSE SKIN AND EYE IRRITATION. ASPIRATION HAZARD - CAN CAUSE LIFE-THREATENING LUNG DAMAGE IF SWALLOWED. MAY CAUSE REPRODUCTIVE EFFECTS, BASED ON ANIMAL TESTS. KEEP AWAY FROM HEAT, SPARKS, AND FLAME. AVOID BREATHING VAPOR OR MISTS. AVOID CONTACT WITH SKIN OR CLOTHING. USE ONLY WITH ADEQUATE VENTILATION. KEEP CONTAINER CLOSED. WASH THOROUGHLY AFTER HANDLING. THE RECOMMENDED STORAGE TEMPERATURE IS 21-32 DEG.C (70-90 DEG. F).

RECOMMENDED MAXIMUM SHELF-LIFE FOR UNOPENED CONTAINERS IS 2 YEARS.

FIRST AID:
IN CASE OF CONTACT, IMMEDIATELY FLUSH SKIN OR EYES FOR AT LEAST 15 MINUTES. IF
INHALED, MOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF
BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF FIRE:
USE FOG, FOAM, DRY CHEMICAL OR CO2. LIQUID WILL FLOAT AND MAY RE-IGNITE ON THE
SURFACE OF WATER.

IN CASE OF SPILL:
ABSORB SPILL WITH INERT MATERIAL (E.G. ACTIVATED CARBON) THEN PLACE IN SUITABLE
CONTAINER. REFER TO MATERIAL SAFETY DATA SHEET FOR ADDITIONAL INFORMATION ON THIS PRODUCT.

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS:
THE COMPONENTS OF THIS PRODUCT ARE ON THE DSL INVENTORY.

OTHER CANADIAN REGULATIONS: NOT APPLICABLE.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LIST:
THE COMPONENTS OF THIS PRODUCT ARE NOT ON THE CEPA PRIORITIES SUBSTANCES LIST.

CANADIAN WHMIS SYMBOLS:
CLASS B2: FLAMMABLE LIQUID
CLASS D2A/B: MATERIALS CAUSING OTHER TOXIC EFFECTS

EUROPEAN COMMUNITY INFORMATION:

EUROPEAN COMMUNITY INFORMATION FOR PRODUCT:

EC LABELING AND CLASSIFICATION:
BASED ON THE INFORMATION ON THE PRODUCT'S COMPONENTS AND AN ASSESSMENT OF THE
PHYSICAL AND HEALTH HAZARDS ASSOCIATED WITH THE MATERIAL, THE FOLLOWING ASSIGNMENTS HAVE BEEN MADE (PER COUNCIL DIRECTIVE 67/548/EEC)

EC CLASSIFICATION: HIGHLY FLAMMABLE. IRRITANT. (F; Xi)

EC RISK PHRASES:
HIGHLY FLAMMABLE. MAY FORM EXPLOSIVE PEROXIDES. IRRITATING TO EYES AND RESPIRATORY SYSTEM. (R: 11-19-36/37)

EC SAFETY PHRASES:
KEEP OUT OF REACH OF CHILDREN.* KEEP AWAY FROM SOURCES OF IGNITION - NO SMOKING. DO NOT EMPTY INTO DRAINS. DO NOT BREATHE VAPORS. AVOID CONTACT WITH THE EYES. TAKE PRECAUTIONARY MEASURES AGAINST STATIC DISCHARGES. (S: (2-)*16-23-25-29-33)
*THIS SAFETY PHRASE CAN BE OMITTED FROM THE LABEL WHEN THE SUBSTANCE OR PREPARATION IS SOLD FOR INDUSTRIAL USE ONLY.

EUROPEAN COMMUNITY ANNEX II HAZARD SYMBOLS:
EXTREMELY OR HIGHLY FLAMMABLE
HARMFUL OR IRRITANT

EUROPEAN COMMUNITY INFORMATION FOR CONSTITUENTS:
THE FOLLOWING INFORMATION IS AVAILABLE FOR PRIMARY CONSTITUENTS IN THE COMPONENTS OF THIS PRODUCT.

ACETONE:

EC CLASSIFICATION: HIGHLY FLAMMABLE. (F)

EC RISK PHRASES: HIGHLY FLAMMABLE. (R: 11).

EC SAFETY PHRASES:
KEEP OUT OF REACH OF CHILDREN.
*KEEP CONTAINER IN A WELL-VENTILATED PLACE. KEEP AWAY FROM SOURCES OF IGNITION. NO SMOKING. DO NOT BREATHE VAPORS. (S: (2-) *9-16-23-33).

EC COMMENTS:
*THIS SAFETY PHRASE CAN BE OMITTED FROM THE LABEL WHEN THE SUBSTANCE OR PREPARATION IS SOLD FOR INDUSTRIAL USE ONLY.

CYCLOHEXANONE:

EC CLASSIFICATION: FLAMMABLE. HARMFUL. (F; Xn)

EC RISK PHRASES: FLAMMABLE. HARMFUL BY INHALATION. (R; 10-20).

EC SAFETY PHRASES:
KEEP OUT OF REACH OF CHILDREN.* AVOID CONTACT WITH THE EYES. (S: (2-)* 25).
*THIS SAFETY PHRASE CAN BE OMITTED FROM THE LABEL WHEN THE SUBSTANCE OR PREPARATION IS SOLD FOR INDUSTRIAL USE ONLY.

EC COMMENTS:

CONCENTRATION GREATER THAN OR EQUAL TO 25%:
HARMFUL. HARMFUL BY INHALATION. (Xn; R20). THIS PRODUCT CONTAINS LESS THAN THIS
CONCENTRATION; THEREFORE, THIS RISK HAS BEEN OMITTED.

METHYL ETHYL KETONE:

EC CLASSIFICATION: HIGHLY FLAMMABLE. IRRITANT. (F; Xi)

EC RISK PHRASES:
HIGHLY FLAMMABLE. IRRITATING TO THE EYES AND RESPIRATORY SYSTEM. (R: 11-36/37).

EC SAFETY PHRASES:
KEEP OUT OF REACH OF CHILDREN.* KEEP CONTAINER IN A WELL-VENTILATED PLACE. KEEP
AWAY FROM SOURCES OF IGNITION. NO SMOKING.

AVOID CONTACT WITH THE EYES. TAKE PRECAUTIONARY MEASURES AGAINST STATIC DISCHARGES. (S: (2-)*9-16-25-33).

EC COMMENTS:
*THIS SAFETY PHRASE CAN BE OMITTED FROM THE LABEL WHEN THE SUBSTANCE OR PREPARATION IS SOLD FOR INDUSTRIAL USE ONLY.

POLYVINYL CHLORIDE:
AN OFFICIAL CLASSIFICATION FOR THIS SUBSTANCE HAS NOT BEEN PUBLISHED IN COMMISSION DIRECTIVES 93/72/EEC, 94/69/EC, AND 96/54/EC.

SILICON DIOXIDE:
AN OFFICIAL CLASSIFICATION FOR THIS SUBSTANCE HAS NOT BEEN PUBLISHED IN COMMISSION DIRECTIVES 93/72/EEC, 94/69/EC, AND 96/54/EC.

TETRAHYDROFURAN:

EC CLASSIFICATION: HIGHLY FLAMMABLE. IRRITANT. (F; Xi)

EC RISK PHRASES:
HIGHLY FLAMMABLE. MAY FORM EXPLOSIVE PEROXIDES. IRRITATING TO EYES AND RESPIRATORY SYSTEM. (R: 11-19-36/37)

EC SAFETY PHRASES:
KEEP OUT OF REACH OF CHILDREN.
*KEEP AWAY FROM SOURCES OF IGNITION - NO SMOKING. DO NOT EMPTY INTO DRAINS. TAKE PRECAUTIONARY MEASURES AGAINST STATIC DISCHARGES. (S: (2-)*16-29-33)
*THIS SAFETY PHRASE CAN BE OMITTED FROM THE LABEL WHEN THE SUBSTANCE OR PREPARATION IS SOLD FOR INDUSTRIAL USE ONLY.

EC COMMENTS:

CONCENTRATIONS GREATER THAN OR EQUAL TO 25 PERCENT:
IRRITANT. IRRITATING TO EYES AND RESPIRATORY SYSTEM. (Xi; R36/37)

16. OTHER INFORMATION

PREPARED BY:
CHEMICAL SAFETY ASSOCIATES, INC.
9163 CHESAPEAKE DRIVE
SAN DIEGO, CA 92123-1002
619/565-0302

EDITED/UPDATED BY: JOHN BROWN, E-Z WELD, INC

DATE OF PRINTING: NOVEMBER 12, 2008

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED ACCURATE. HOWEVER,
NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF. COOKSON ASSUMES NO RESPONSIBILITY FOR INJURY TO THE VENDEE OR THIRD PERSONS PROXIMATELY CAUSED BY THE MATERIAL IF REASONABLE SAFETY PROCEDURES ARE NOT ADHERED TO AS STIPULATED IN THE DATA SHEET. ADDITIONALLY, COOKSON ASSUMES NO RESPONSIBILITY FOR INJURY TO VENDEE OR THIRD PERSONS PROXIMATELY CAUSED BY ABNORMAL USE OF THE MATERIAL EVEN IF REASONABLE SAFETY PROCEDURES ARE FOLLOWED. FURTHERMORE, VENDEE ASSUMES THE RISK IN HIS USE OF THE MATERIAL.

LVOC PVC CEMENT PRODUCTS

NALCO

SAFETY DATA SHEET

PRODUCT

ULTRION® 7157

EMERGENCY TELEPHONE NUMBER(S)
(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **ULTRION® 7157**

APPLICATION : COAGULANT

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 0 / 1 FLAMMABILITY : 1 / 1 INSTABILITY : 0 / 0 OTHER : 0
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme * = Chronic Health Hazard

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Aluminum Hydroxychloride	1327-41-9	10.0 - 30.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

CAUTION
May cause irritation with prolonged contact. Toxic to aquatic organisms.
Do not get in eyes, on skin, on clothing. Do not take internally. Wear suitable protective clothing. Keep container tightly closed. Flush affected area with water. Protect product from freezing.
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Can cause mild irritation.

SKIN CONTACT :
May cause irritation with prolonged contact.

NALCO

SAFETY DATA SHEET

PRODUCT

ULTRION® 7157

EMERGENCY TELEPHONE NUMBER(S)
(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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NFPA 704M/HMIS RATING
HEALTH : 0 / 1 FLAMMABILITY : 1 / 1 INSTABILITY : 0 / 0 OTHER : 0
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme * = Chronic Health Hazard

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May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Can cause mild irritation.

SKIN CONTACT :
May cause irritation with prolonged contact.

INGESTION :
Not a likely route of exposure. No adverse effects expected.

INHALATION :
Not a likely route of exposure. No adverse effects expected.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
A review of available data does not identify any symptoms from exposure not previously mentioned.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

4. FIRST AID MEASURES

EYE CONTACT :
Flush affected area with water. If symptoms develop, seek medical advice.

SKIN CONTACT :
Flush affected area with water. If symptoms develop, seek medical advice. Remove contaminated clothing. Wash off affected area immediately with plenty of water. If symptoms develop, seek medical advice.

INGESTION :
Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. If symptoms develop, seek medical advice.

INHALATION :
Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : > 212 °F / > 100 °C (PMCC)

EXTINGUISHING MEDIA :
This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Stop or reduce any leaks if it is safe to do so. Do not touch spilled material. Ventilate spill area if possible. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection).

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Avoid eye and skin contact. Do not take internally. Ensure all containers are labeled. Keep the containers closed when not in use.

STORAGE CONDITIONS :
Store the containers tightly closed.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below.

Country/Source	Substance(s)	Category:	ppm	mg/m3

ENGINEERING MEASURES :
General ventilation is recommended.

RESPIRATORY PROTECTION :
Respiratory protection is not normally needed.

HAND PROTECTION :
Neoprene gloves Nitrile gloves Butyl gloves PVC gloves

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is:
Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Hazy Yellow
ODOR	None
SPECIFIC GRAVITY	1.23 - 1.29 @ 60 °F / 15.5 °C
DENSITY	10.2 - 10.7 lb/gal
SOLUBILITY IN WATER	Complete
pH (100 %)	2.7
VISCOSITY	14 cps
FREEZING POINT	-23 °F / -30.6 °C
BOILING POINT	225 °F / 107.2 °C

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Freezing temperatures.

MATERIALS TO AVOID :
None known

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of nitrogen, Oxides of carbon

11. TOXICOLOGICAL INFORMATION

No toxicity studies have been conducted on this product.

SENSITIZATION :
This product is not expected to be a sensitizer.

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: Low

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The tests for (products or similar products) were performed in clean water as set forth by USEPA (EPA/600/4-90/027). In order to evaluate the potential toxicity mitigation, the tests for (representative polymers) were performed in environmentally relevant water with dissolved organic carbon (DOC: 4.5 mg/l). The toxicity of this product is due to an external mode of action, e.g., suffocation or immobilization. In the presence of suspended material, e.g., DOC, the polymers are bound to suspended material and the bioavailability is substantially reduced. As a result, the toxicity is expected to be lower. Under normal use and discharge conditions, the LC50 values of the representative polymers tested in the presence of DOC are expected to apply to this product. However, for large spills, the clean water data is more applicable.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Rainbow Trout	96 hrs	4.9 mg/l	Similar product tested in clean water
Fathead Minnow	96 hrs	18 mg/l	Similar product tested in clean water
Zebra Danio	96 hrs	10 - 100 mg/l	Representative polymer tested in water with DOC

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	48 hrs	270 mg/l		Similar Product

ADDITIONAL ECOLOGICAL DATA
NOEC on earthworm: > 1000 mg/l (representative polymer)

PERSISTENCY AND DEGRADATION :

Chemical Oxygen Demand (COD) : 28,300 mg/l

Biological Oxygen Demand (BOD) :

Incubation Period	Value	Test Descriptor

5 d	0 mg/l	Product

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

BIOACCUMULATION POTENTIAL
No bioaccumulation will occur. The large size of the polymer is incompatible with transport across the cellular membranes.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Moderate
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Low

OTHER INFORMATION
The hazard characterization is based on the tests or potential hazard in the clean water.

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

As a non-hazardous waste, it is not subject to federal regulation. Consult state or local regulation for any additional handling, treatment or disposal requirements. For disposal, contact a properly licensed waste treatment, storage, disposal or recycling facility.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Aluminum Hydroxychloride : Exposure Limit - Compound Class, Eye irritant

CERCLA/SUPERFUND, 40 CFR 117, 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

CLEAN AIR ACT, Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

CALIFORNIA PROPOSITION 65 :
Substances known to the State of California to cause cancer are present as an impurity or residue.

MICHIGAN CRITICAL MATERIALS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Aluminum Hydroxychloride	1327-41-9
Polyquaternary Amine Chloride	Proprietary
Calcium Dihydrogen Orthophosphate	7758-23-8
Calcium Chloride	10043-52-4
Water	7732-18-5

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS CLASSIFICATION :
Not considered a WHMIS controlled product.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substance(s) in this preparation are included in or exempted from the EINECS or ELINCS inventories

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

KOREA
This product contains substance(s) which are not in compliance with the Toxic Chemical Control Law (TCCL) and may require additional review.

NEW ZEALAND
All substances in this product comply with the Hazardous Substances and New Organisms (HSNO) Act 1996,and are listed on or are exempt from the New Zealand Inventory of Chemicals.

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Low

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 07/31/2009
Version Number : 1.8

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™ CD-ROM Version),
Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH,
(TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight™ (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight™ CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 03/31/2010
Version Number : 1.21

NSF INTERNATIONAL :
This product has received NSF/International certification under NSF/ANSI Standard 60 in the coagulation and flocculation category. This product has received NSF/International certification under NSF/ANSI Standard 60 in the Filtration Aid category. The official name is "Polyacrylamide." Maximum product application dosage is : 1 mg/l.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
This product may contain trace levels (<0.1% for carcinogens, <1% all other substances) of the following substance(s) listed under the regulation. Additional components may be unintentionally present at trace levels.

Substance(s)	Citations
• Benzene	Sec. 307, Sec. 311

CLEAN AIR ACT, Sec. 112 (Hazardous Air Pollutants, as amended by 40 CFR 63), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
This product may contain trace levels (<0.1% for carcinogens, <1% all other substances) of the following substance(s) listed under the regulation. Additional components may be unintentionally present at trace levels.

Substance(s)	Citations
• Benzene • Acrylamide	Sec. 112

CALIFORNIA PROPOSITION 65 :
This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels, which would require a warning under the statute.

MICHIGAN CRITICAL MATERIALS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

STATE RIGHT TO KNOW LAWS :
Substances listed under this regulation are not intentionally added or expected to be present in this product. Listed components may be present at trace levels.

INTERNATIONAL CHEMICAL CONTROL LAWS :

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	10 - 30%	70 - 90%

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Moderate
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: Moderate

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it could meet the criteria of a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Before disposal, it should be determined if the waste meets the criteria of a hazardous waste.

Hazardous Waste: D018

Hazardous wastes must be transported by a licensed hazardous waste transporter and disposed of or treated in a properly licensed hazardous waste treatment, storage, disposal or recycling facility. Consult local, state, and federal regulations for specific requirements.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name : PRODUCT IS NOT REGULATED DURING

General ventilation is recommended.

RESPIRATORY PROTECTION :
Due to its low volatility and toxicity, the hazard potential associated with this material is relatively low. Respiratory protection is not normally needed.

HAND PROTECTION :
Nitrile gloves PVC gloves

SKIN PROTECTION :
Wear standard protective clothing.

EYE PROTECTION :
Wear chemical splash goggles.

HYGIENE RECOMMENDATIONS :
Use good work and personal hygiene practices to avoid exposure. Keep an eye wash fountain available. Keep a safety shower available. If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Emulsion
APPEARANCE	Opaque Off-white
ODOR	Hydrocarbon
SPECIFIC GRAVITY	1.03 - 1.07 @ 77 °F / 25 °C
DENSITY	8.6 - 9.0 lb/gal
SOLUBILITY IN WATER	Emulsifiable
pH (100 %)	8
VISCOSITY	400 - 1,200 cps @ 77 °F / 25 °C
FREEZING POINT	< -4 °F / < -20 °C
VOC CONTENT	27.4 % EPA Method 24

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

INHALATION :
Not a likely route of exposure. No adverse effects expected.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
Frequent or prolonged contact with product may defat and dry the skin, leading to discomfort and dermatitis.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

4. FIRST AID MEASURES

EYE CONTACT :
Immediately flush eye with water for at least 15 minutes while holding eyelids open. Get medical attention.

SKIN CONTACT :
Remove contaminated clothing. Wash off affected area immediately with soap and plenty of water. If symptoms develop, seek medical advice.

INGESTION :
Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. If symptoms develop, seek medical advice.

INHALATION :
Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition. If swallowed a jelly mass may form which in digestion may cause blockage.

5. FIRE FIGHTING MEASURES

FLASH POINT :	Not flammable
LOWER EXPLOSION LIMIT :	Not flammable
UPPER EXPLOSION LIMIT :	Not flammable

EXTINGUISHING MEDIA :
Foam, Dry powder, Carbon dioxide, Other extinguishing agent suitable for Class B fires

UNSUITABLE EXTINGUISHING MEDIA :
Do not use water unless flooding amounts are available.

World Headquarters
Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Date Printed 2/24/09
MSDS No: M01385

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Hexavalent Chromium Standard Solution Ampule 5.0 mg/L as Cr^{+6}
Catalog Number: 2605620

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M01385
Chemical Name: Not applicable
CAS No.: Not applicable
Chemical Formula: Not applicable
Chemical Family: Not applicable
Hazard: Causes asthma Causes damage to the nasal epithelia and skin Causes lung cancer
Date of MSDS Preparation:
Day: 20
Month: September
Year: 2007

2. COMPOSITION / INFORMATION ON INGREDIENTS

Demineralized Water
CAS No.: 7732-18-5
TSCA CAS Number: 7732-18-5
Percent Range: > 99.0
Percent Range Units: volume / volume
LD50: None reported
LC50: None reported
TLV: Not established
PEL: Not established
Hazard: No effects anticipated.

Potassium Dichromate
CAS No.: 7778-50-9
TSCA CAS Number: 7778-50-9
Percent Range: < 0.01
Percent Range Units: weight / volume
LD50: Oral mouse LD_{50} = 190 mg/kg; Oral human (child) LDLo = 26 mg/kg.
LC50: None reported.
TLV: 0.05 mg Cr^6/m^3 (0.0235 ppm) Water-soluble
PEL: 5 µg/m³ (0.00235 ppm Cr^{+6}), 8 Hr TWA; Action Level is 2.5 µg/m^3 (0.00117 ppm), 8 Hr TWA
Hazard: Toxic. Causes burns. May cause allergic reaction. Experimental mutagen. Experimental teratogen. Oxidizer. Causes asthma Causes damage to the nasal epithelia and skin Causes lung cancer

3. HAZARDS IDENTIFICATION

Flammability Limits:
Lower Explosion Limits: Not applicable
Upper Explosion Limits: Not applicable
Autoignition Temperature: Not applicable
Hazardous Combustion Products: This material will not burn.
Fire / Explosion Hazards: This product will not burn or explode.
Static Discharge: None reported.
Mechanical Impact: None reported
Extinguishing Media: Use media appropriate to surrounding fire conditions
Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:
Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance.
Containment Technique: Absorb spilled liquid with non-reactive sorbent material. Stop spilled material from being released to the environment.
Clean-up Technique: Cover spilled material with an alkali, such as soda ash or sodium bicarbonate. Scoop up slurry into a large beaker. Dispose of material in an E.P.A. approved hazardous waste facility. Decontaminate the area of the spill with a soap solution.
Evacuation Procedure: Evacuate as needed to perform spill clean-up. If conditions warrant, increase the size of the evacuation.
Special Instructions (for accidental release): Mixture contains a component which is regulated as a hazardous air pollutant. Mixture contains a component which is regulated as a water pollutant. Product is regulated as RCRA hazardous waste.
304 EHS RQ (40 CFR 355): Not applicable
D.O.T. Emergency Response Guide Number: None

7. HANDLING / STORAGE

Handling: Avoid contact with eyes Do not breathe mist or vapors. Wash thoroughly after handling. Maintain general industrial hygiene practices when using this product.
Storage: Keep container tightly closed when not in use. Protect from: extreme temperatures
Flammability Class: Not applicable

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Have an eyewash station nearby. Maintain adequate ventilation to keep exposure levels below the published exposure limits for chemicals in this product. Refer to the OSHA Standard at 29CFR1910.1026 for Cr (VI) (See Federal Register 28 February 2006 Page 10100.)
Personal Protective Equipment:
Eye Protection: safety glasses with top and side shields
Skin Protection: disposable latex gloves
Inhalation Protection: adequate ventilation
Precautionary Measures: Avoid contact with: eyes Do not breathe: mist/vapor Wash thoroughly after handling. Protect from: heat freezing
TLV: Not established. 0.05 mg/m³ (0.0235 ppm as Cr^{+6}).
PEL: Not established. 5 µg/m³ (0.00235 ppm Cr^{+6}), 8 Hr TWA; Action Level is 2.5 µg/m³ (0.00117 ppm), 8 Hr TWA.

13. DISPOSAL CONSIDERATIONS

EPA Waste ID Number: D007
Special Instructions (Disposal): Dispose of material in an E.P.A. approved hazardous waste facility.
Empty Containers: Rinse three times with an appropriate solvent. Rinsate from empty containers is hazardous waste and should be disposed of at an E.P.A. approved facility. Dispose of empty container as normal trash.
NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

D.O.T.:
D.O.T. Proper Shipping Name: Not Currently Regulated
--
DOT Hazard Class: NA
DOT Subsidiary Risk: NA
DOT ID Number: NA
DOT Packing Group: NA
I.C.A.O.:
I.C.A.O. Proper Shipping Name: Not Currently Regulated
--
ICAO Hazard Class: NA
ICAO Subsidiary Risk: NA
ICAO ID Number: NA
ICAO Packing Group: NA
I.M.O.:
I.M.O. Proper Shipping Name: Not Currently Regulated
--
I.M.O. Hazard Class: NA
I.M.O. Subsidiary Risk: NA
I.M.O. ID Number: NA
I.M.O. Packing Group: NA
Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

U.S. Federal Regulations:
O.S.H.A.: This product meets the criteria for a hazardous substance as defined in the Hazard Communication Standard. (29 CFR 1910.1200)
E.P.A.:
S.A.R.A. Title III Section 311/312 Categorization (40 CFR 370): Delayed (Chronic) Health Hazard
S.A.R.A. Title III Section 313 (40 CFR 372): This product does NOT contain any chemical subject to the reporting requirements of Section 313 of Title III of SARA.
--
302 (EHS) TPQ (40 CFR 355): Not applicable
304 CERCLA RQ (40 CFR 302.4): Potassium bichromate: 10 lbs.
304 EHS RQ (40 CFR 355): Not applicable

The following list contains the Material Safety Data Sheets you requested. Please scoll down to view the requested MSDS(s).

Product	MSDS	Distributor	Format	Language	Quantity
204399	N/A	Hach Company	OSHA	English	1

Total Enclosures: 1

World Headquarters
Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

MSDS No: M00033

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Chromium 1 Reagent
Catalog Number: 204399

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M00033
Chemical Name: Not applicable
CAS No.: Not applicable
Chemical Formula: Not applicable
Chemical Family: Not applicable
Hazard: Causes severe burns. Toxic.
Date of MSDS Preparation:
Day: 27
Month: March
Year: 2010

2. COMPOSITION / INFORMATION ON INGREDIENTS

Lithium Hypobromite
CAS No.: 13824-95-8
TSCA CAS Number: 13824-95-8
Percent Range: 10.0 - 20.0
Percent Range Units: weight / weight
LD50: None reported
LC50: None reported
TLV: Not established
PEL: Not established
Hazard: Causes burns. Oxidizer. Toxic.

Lithium Hydroxide, Anhydrous
CAS No.: 1310-65-2
TSCA CAS Number: 1310-65-2
Percent Range: 40.0 - 50.0
Percent Range Units: weight / weight
LD50: Oral rat LD50 = 225 mg/kg
LC50: Inhalation rat LC50 = 980 mg/m^3/4H
TLV: 3mg/m^3 Respirable Particles; 10 mg/m^3 Inhalable particles
PEL: 5 mg/m^3 Respirable Fraction; 15 mg/m^3 Total Dust
Hazard: Toxic. Causes severe burns. Harmful if swallowed

Sodium Sulfate
CAS No.: 7757-82-6
TSCA CAS Number: 7757-82-6
Percent Range: 35.0 - 45.0
Percent Range Units: weight / weight
LD50: Oral mouse LD50 = 5989 mg/kg
LC50: None reported
TLV: Not established
PEL: Not established

Hazard: May cause irritation.

3. HAZARDS IDENTIFICATION

Emergency Overview:
Appearance: Bright yellow powder
Odor: Not determined
CAUSES SEVERE BURNS HARMFUL IF SWALLOWED

HMIS:
Health: 3
Flammability: 0
Reactivity: 1
Protective Equipment: X - See protective equipment, Section 8.
NFPA:
Health: 3
Flammability: 0
Reactivity: 1
Symbol: Not applicable
Potential Health Effects:
Eye Contact: Causes eye burns.
Skin Contact: Causes burns.
Skin Absorption: None reported
Target Organs: None reported
Ingestion: Toxic Causes: severe burns May cause: central nervous system effects kidney damage dizziness nausea vomiting liver damage coma death
Target Organs: Kidneys Central nervous system Bone marrow Liver
Inhalation: Causes: severe burns shortness of breath coughing
Target Organs: None reported
Medical Conditions Aggravated: Pre-existing: Eye conditions Skin conditions Respiratory conditions Kidney conditions Liver conditions
Chronic Effects: Lithium compounds have been implicated in development of aplastic anemia. Signs of lithium poisoning include dehydration, extreme weight loss, fine tremor of hands, nausea, vomiting and diarrhea, Chronic overexposure may cause central nervous system effects kidney damage liver damage
Cancer / Reproductive Toxicity Information:
This product does NOT contain any OSHA listed carcinogens.

This product does NOT contain any IARC listed chemicals.

This product does NOT contain any NTP listed chemicals.

Additional Cancer / Reproductive Toxicity Information: Tests performed on this product / components gave insufficient evidence to classify for carcinogenicity.
Toxicologically Synergistic Products: None reported

4. FIRST AID

Eye Contact: Immediately flush eyes with water for 15 minutes. Call physician.
Skin Contact (First Aid): Wash skin with plenty of water for 15 minutes. Remove contaminated clothing. Call physician immediately.
Ingestion (First Aid): Do not induce vomiting. Give 1-2 glasses of water. Call physician immediately. Never give anything by mouth to an unconscious person.
Inhalation: Remove to fresh air. Give artificial respiration if necessary. Call physician.

5. FIRE FIGHTING MEASURES

Flammable Properties: During a fire, corrosive and toxic gases may be generated by thermal decomposition.
Flash Point: Not applicable

Method: Not applicable
Flammability Limits:
Lower Explosion Limits: Not applicable
Upper Explosion Limits: Not applicable
Autoignition Temperature: Not applicable
Hazardous Combustion Products: Toxic fumes of: hydrogen bromide sulfur oxides. sodium monoxide
Fire / Explosion Hazards: Contact with metals gives off hydrogen gas which is flammable May react violently with: organic materials
Static Discharge: None reported.
Mechanical Impact: None reported
Extinguishing Media: Water. Carbon dioxide Dry chemical.
Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:
Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance.
Containment Technique: Stop spilled material from being released to the environment. Cover spilled solid material with sand or other inert material.
Clean-up Technique: Work in an approved fume hood. Dilute with a large excess of water. Adjust to a pH between 6 and 9 with an acid, such as sulfuric or citric. Flush reacted material to the drain with a large excess of water. Decontaminate the area of the spill with a soap solution.
Evacuation Procedure: Evacuate local area (15 foot radius or as directed by your facility's emergency response plan) when: any quantity is spilled. If conditions warrant, increase the size of the evacuation.
Special Instructions (for accidental release): Not applicable
304 EHS RQ (40 CFR 355): Not applicable
D.O.T. Emergency Response Guide Number: 154

7. HANDLING / STORAGE

Handling: Avoid contact with eyes skin clothing Do not breathe dust. Wash thoroughly after handling. Maintain general industrial hygiene practices when using this product.
Storage: Store between 10° and 25°C. Keep away from: acids Protect from: heat moisture
Flammability Class: Not applicable

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Have a safety shower nearby. Have an eyewash station nearby. Use a fume hood to avoid exposure to dust, mist or vapor. Maintain general industrial hygiene practices when using this product.
Personal Protective Equipment:
Eye Protection: safety glasses with top and side shields
Skin Protection: lab coat disposable latex gloves
Inhalation Protection: laboratory fume hood
Precautionary Measures: Avoid contact with: eyes skin clothing Do not breathe: dust Wash thoroughly after handling. Keep away from: acids/acid fumes Protect from: heat moisture
TLV: Not established
PEL: Not established

9. PHYSICAL / CHEMICAL PROPERTIES

Appearance: Bright yellow powder
Physical State: Solid
Molecular Weight: Not applicable
Odor: Not determined
pH: aqueous solution > 11
Vapor Pressure: Not applicable
Vapor Density (air = 1): Not applicable

Boiling Point: Not applicable
Melting Point: >400°C; 752°F
Specific Gravity (water = 1): 1.48
Evaporation Rate (water = 1): Not applicable
Volatile Organic Compounds Content: Not applicable
Partition Coefficient (n-octanol / water): Not applicable
Solubility:
Water: Partially soluble
Acid: Partially soluble
Other: Not determined
Metal Corrosivity:
Steel: Not applicable
Aluminum: Not applicable

10. STABILITY / REACTIVITY

Chemical Stability: Stable when stored under proper conditions.
Conditions to Avoid: Excess moisture Heat
Reactivity / Incompatibility: Incompatible with: acids metals combustible materials
Hazardous Decomposition: Contact with metals may release flammable hydrogen gas. Toxic fumes of: hydrogen bromide sodium monoxide sulfur oxides
Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Product Toxicological Data:
LD50: None reported
LC50: None reported
Dermal Toxicity Data: None reported
Skin and Eye Irritation Data: None reported
Mutation Data: None reported
Reproductive Effects Data: Sodium Sulfate Oral mouse TDLo = 14 g/kg (Unspecified neonatal effects); TDLo = 60 mg/kg Reproductive effects - Embryo or fetus - fetotoxicity, Specific developmental abnormalities - musculoskeletal
Ingredient Toxicological Data: Lithium Hydroxide Oral rat LD50 = 225 mg/kg; Sodium Sulfate Oral mouse LD50 = 5989 mg/kg

12. ECOLOGICAL INFORMATION

Product Ecological Information: --
No ecological data available for this product.
Ingredient Ecological Information: Sodium Sulfate aquatic toxicity: TLm 13500 mg/l bluegill sunfish/ 96 hours, TLm 16500 mg/l mosquito fish / 96 hours

13. DISPOSAL CONSIDERATIONS

EPA Waste ID Number: None
Special Instructions (Disposal): Work in an approved fume hood. Dilute material with excess water making a weaker than 5% solution. Adjust to a pH between 6 and 9 with an acid, such as sulfuric or citric. Open cold water tap completely, slowly pour the reacted material to the drain. Allow cold water to run for 5 minutes to completely flush the system.
Empty Containers: Rinse three times with an appropriate solvent. Dispose of empty container as normal trash.
NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

D.O.T.:
D.O.T. Proper Shipping Name: Corrosive Solid, Basic, Inorganic, N.O.S.

(Lithium Hypobromite/Lithium Hydroxide Mixture)
DOT Hazard Class: 8
DOT Subsidiary Risk: NA
DOT ID Number: UN3262
DOT Packing Group: II
I.C.A.O.:
I.C.A.O. Proper Shipping Name: Corrosive Solid, Basic, Inorganic, N.O.S.
(Lithium Hypobromite/Lithium Hydroxide Mixture)
ICAO Hazard Class: 8
ICAO Subsidiary Risk: NA
ICAO ID Number: UN3262
ICAO Packing Group: II
I.M.O.:
I.M.O. Proper Shipping Name: Corrosive Solid, Basic, Inorganic, N.O.S.
(Lithium Hypobromite/Lithium Hydroxide Mixture)
I.M.O. Hazard Class: 8
I.M.O. Subsidiary Risk: NA
I.M.O. ID Number: UN3262
I.M.O. Packing Group: II
Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

U.S. Federal Regulations:
O.S.H.A.: This product meets the criteria for a hazardous substance as defined in the Hazard Communication Standard. (29 CFR 1910.1200)
E.P.A.:
S.A.R.A. Title III Section 311/312 Categorization (40 CFR 370): Immediate (Acute) Health Hazard
S.A.R.A. Title III Section 313 (40 CFR 372): This product does NOT contain any chemical subject to the reporting requirements of Section 313 of Title III of SARA.
--
302 (EHS) TPQ (40 CFR 355): Not applicable
304 CERCLA RQ (40 CFR 302.4): Not applicable
304 EHS RQ (40 CFR 355): Not applicable
Clean Water Act (40 CFR 116.4): Not applicable
RCRA: Contains no RCRA regulated substances.
C.P.S.C.: The label for this product bears the signal word "POISON" because the concentration of Lithium Hydroxide in the product is greater than/ equal to 10%
State Regulations:
California Prop. 65: No Prop. 65 listed chemicals are present in this product.
Identification of Prop. 65 Ingredient(s): None
California Perchlorate Rule CCR Title 22 Chap 33:
Trade Secret Registry: Not applicable
National Inventories:
U.S. Inventory Status: This product contains a chemical(s) exempt from the TSCA 8(b) Inventory due to a Low Volume Exemption held by Hach Company.
TSCA CAS Number: Not applicable
Lithium Hypobromite. This chemical may only be used as an oxidant in tests for total chromium.

16. OTHER INFORMATION

Intended Use: Determination of chromium
References: 29 CFR 1900 - 1910 (Code of Federal Regulations - Labor). Air Contaminants, Federal Register, Vol. 54, No. 12. Thursday, January 19, 1989. pp. 2332-2983. TLV's Threshold Limit Values and Biological Exposure Indices for 1992-1993. American Conference of Governmental Industrial Hygienists, 1992. In-house information. Outside Testing. Technical Judgment. Gosselin, R. E. et al. Clinical Toxicology of Commercial Products, 5th Ed. Baltimore: The Williams and Wilkins Co., 1984.

Revision Summary: Updates in Section(s) 14.

Legend:

NA - Not Applicable	w/w - weight/weight
ND - Not Determined	w/v - weight/volume
NV - Not Available	v/v - volume/volume

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

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Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Date Printed 11/13/09
MSDS No: M00001

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: ChromaVer® 3 Chromium Reagent
Catalog Number: 1271099

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M00001
Chemical Name: Not applicable
CAS No.: Not applicable
Chemical Formula: Not applicable
Chemical Family: Not applicable
Hazard: Causes eye burns.
Date of MSDS Preparation:
Day: 15
Month: October
Year: 2009

2. COMPOSITION / INFORMATION ON INGREDIENTS

Potassium Pyrosulfate
CAS No.: 7790-62-7
TSCA CAS Number: 7790-62-7
Percent Range: 75.0 - 85.0
Percent Range Units: weight / weight
LD50: Oral rat LD50 = 2340 mg/kg
LC50: None reported
TLV: Not established
PEL: Not established
Hazard: Causes eye burns.

Magnesium Sulfate
CAS No.: 10034-99-8
TSCA CAS Number: 7487-88-9
Percent Range: 15.0 - 25.0
Percent Range Units: weight / weight
LD50: Oral mouse LDLo = 5000 mg/kg
LC50: None reported
TLV: Not established
PEL: Not established
Hazard: May cause irritation.

1,5-Diphenylcarbohydrazide
CAS No.: 140-22-7
TSCA CAS Number: 140-22-7
Percent Range: 0.01 - 0.1
Percent Range Units: weight / weight
LD50: None reported
LC50: None reported
TLV: Not established
PEL: Not established
Hazard: Toxic properties unknown. May cause irritation.

Hazardous Combustion Products: Toxic fumes of: sulfur oxides.
Fire / Explosion Hazards: May react violently with: strong bases strong reducers
Static Discharge: None reported.
Mechanical Impact: None reported
Extinguishing Media: Dry chemical. Carbon dioxide Alcohol foam.
Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:
Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance.
Containment Technique: Stop spilled material from being released to the environment. Cover spilled solid material with sand or other inert material.
Clean-up Technique: Scoop up spilled material into a large beaker and dissolve with water. Adjust to a pH between 6 and 9 with an alkali, such as soda ash or sodium bicarbonate. Flush reacted material to the drain with a large excess of water. Decontaminate the area of the spill with a soap solution.
Evacuation Procedure: Evacuate local area (15 foot radius or as directed by your facility's emergency response plan) when: a pound or more of loose powder is spilled. If conditions warrant, increase the size of the evacuation.
Special Instructions (for accidental release): Not applicable
304 EHS RQ (40 CFR 355): Not applicable
D.O.T. Emergency Response Guide Number: None

7. HANDLING / STORAGE

Handling: Avoid contact with eyes Do not breathe dust. Wash thoroughly after handling. Maintain general industrial hygiene practices when using this product.
Storage: Keep away from: reducers Protect from: moisture Store between 10° and 25°C.
Flammability Class: Not applicable

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Have an eyewash station nearby. Use general ventilation to minimize exposure to mist, vapor or dust. Maintain general industrial hygiene practices when using this product.
Personal Protective Equipment:
Eye Protection: safety glasses with top and side shields
Skin Protection: lab coat disposable latex gloves
Inhalation Protection: adequate ventilation
Precautionary Measures: Avoid contact with: eyes Do not breathe: dust Wash thoroughly after handling. Keep away from: reducers
TLV: Not established
PEL: Not established

9. PHYSICAL / CHEMICAL PROPERTIES

Appearance: White or light pink powder
Physical State: Solid
Molecular Weight: Not applicable
Odor: Not determined
pH: of 5% solution = 1.1
Vapor Pressure: Not applicable
Vapor Density (air = 1): Not applicable
Boiling Point: Not applicable
Melting Point: Decomposes at 215°C; 419°F
Specific Gravity (water = 1): 2.26
Evaporation Rate (water = 1): Not applicable

I.C.A.O. Proper Shipping Name: Not Currently Regulated
--
ICAO Hazard Class: NA
ICAO Subsidiary Risk: NA
ICAO ID Number: NA
ICAO Packing Group: NA
I.M.O.:
I.M.O. Proper Shipping Name: Not Currently Regulated
--
I.M.O. Hazard Class: NA
I.M.O. Subsidiary Risk: NA
I.M.O. ID Number: NA
I.M.O. Packing Group: NA
Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

U.S. Federal Regulations:
O.S.H.A.: This product meets the criteria for a hazardous substance as defined in the Hazard Communication Standard. (29 CFR 1910.1200)
E.P.A.:
S.A.R.A. Title III Section 311/312 Categorization (40 CFR 370): Immediate (Acute) Health Hazard Delayed (Chronic) Health Hazard
S.A.R.A. Title III Section 313 (40 CFR 372): This product does NOT contain any chemical subject to the reporting requirements of Section 313 of Title III of SARA.
--
302 (EHS) TPQ (40 CFR 355): Not applicable
304 CERCLA RQ (40 CFR 302.4): Not applicable
304 EHS RQ (40 CFR 355): Not applicable
Clean Water Act (40 CFR 116.4): Not applicable
RCRA: Contains no RCRA regulated substances.
C.P.S.C.: Not applicable
State Regulations:
California Prop. 65: No Prop. 65 listed chemicals are present in this product.
Identification of Prop. 65 Ingredient(s): Not applicable
California Perchlorate Rule CCR Title 22 Chap 33:
Trade Secret Registry: Not applicable
National Inventories:
U.S. Inventory Status: All ingredients in this product are listed on the TSCA 8(b) Inventory (40 CFR 710).
TSCA CAS Number: Not applicable

16. OTHER INFORMATION

Intended Use: Indicator for chromium
References: TLV's Threshold Limit Values and Biological Exposure Indices for 1992-1993. American Conference of Governmental Industrial Hygienists, 1992. Technical Judgment. Outside Testing. In-house information. Air Contaminants, Federal Register, Vol. 54, No. 12. Thursday, January 19, 1989. pp. 2332-2983. 29 CFR 1900 - 1910 (Code of Federal Regulations - Labor).
Revision Summary: Updates in Section(s) 14,

Legend:

NA - Not Applicable	w/w - weight/weight
ND - Not Determined	w/v - weight/volume

World Headquarters
Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Date Printed 2/23/09
MSDS No: M00034

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Chromium 2 Reagent
Catalog Number: 204499

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M00034
Chemical Name: Not applicable
CAS No.: Not applicable
Chemical Formula: Not applicable
Chemical Family: Not applicable
Hazard: Causes eye burns.
Date of MSDS Preparation:
Day: 25
Month: June
Year: 2007

2. COMPOSITION / INFORMATION ON INGREDIENTS

5-Sulfosalicylic Acid
CAS No.: 5965-83-3
TSCA CAS Number: 97-05-2
Percent Range: 65.0 - 75.0
Percent Range Units: weight / weight
LD50: Oral rat LD50 = 1850 mg/kg (anhydrous)
LC50: None reported
TLV: Not established
PEL: Not established
Hazard: Causes eye burns.

1,2-Cyclohexanediaminetetraacetic Acid Trisodium Salt
CAS No.: 36679-96-6
TSCA CAS Number: 36679-96-6
Percent Range: 15.0 - 25.0
Percent Range Units: weight / weight
LD50: None reported
LC50: None reported
TLV: Not established
PEL: Not established
Hazard: Toxic properties unknown. May cause irritation.

Sodium Sulfate
CAS No.: 7757-82-6
TSCA CAS Number: 7757-82-6
Percent Range: 15.0 - 25.0

Skin Contact (First Aid): Wash skin with plenty of water. Call physician if irritation develops.
Ingestion (First Aid): Do not induce vomiting. Give 1-2 glasses of water. Call physician immediately. Never give anything by mouth to an unconscious person.
Inhalation: Remove to fresh air.

5. FIRE FIGHTING MEASURES

Flammable Properties: Can burn in fire, releasing toxic vapors.
Flash Point: Not applicable
Method: Not applicable
Flammability Limits:
Lower Explosion Limits: Not applicable
Upper Explosion Limits: Not applicable
Autoignition Temperature: Not available
Hazardous Combustion Products: Toxic fumes of: nitrogen oxides. sodium oxides carbon monoxide, carbon dioxide. sulfur oxides.
Fire / Explosion Hazards: None reported
Static Discharge: None reported.
Mechanical Impact: None reported
Extinguishing Media: Use media appropriate to surrounding fire conditions
Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:
Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance.
Containment Technique: Stop spilled material from being released to the environment.
Clean-up Technique: Scoop up spilled material into a large beaker and dissolve with water. Adjust to a pH between 6 and 9 with an alkali, such as soda ash or sodium bicarbonate. Flush reacted material to the drain with a large excess of water. Decontaminate the area of the spill with a soap solution.
Evacuation Procedure: Evacuate local area (15 foot radius or as directed by your facility's emergency response plan) when: a pound or more of loose powder is spilled.
Special Instructions (for accidental release): Not applicable
304 EHS RQ (40 CFR 355): Not applicable
D.O.T. Emergency Response Guide Number: 154

7. HANDLING / STORAGE

Handling: Avoid contact with eyes skin Do not breathe dust. Wash thoroughly after handling. Maintain general industrial hygiene practices when using this product.
Storage: Protect from: heat Keep away from: oxidizers
Flammability Class: Not applicable

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Have an eyewash station nearby. Maintain general industrial hygiene practices when using this product.
Personal Protective Equipment:

12. ECOLOGICAL INFORMATION

Product Ecological Information: --
No ecological data available for this product.
Ingredient Ecological Information: Sodium Sulfate Aquatic toxicity TLm 13500 mg/l bluefill sunfish/96 hr, TLm 16500 mg/l mosquito fish/96 hr

13. DISPOSAL CONSIDERATIONS

EPA Waste ID Number: None
Special Instructions (Disposal): Work in an approved fume hood. Dilute material with excess water making a weaker than 5% solution. Adjust to a pH between 6 and 9 with an alkali, such as soda ash or sodium bicarbonate. Open cold water tap completely, slowly pour the reacted material to the drain. Allow cold water to run for 5 minutes to completely flush the system.
Empty Containers: Rinse three times with an appropriate solvent. Dispose of empty container as normal trash.
NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

D.O.T.:
D.O.T. Proper Shipping Name: Corrosive Solid, Acidic, Organic, N.O.S. (Sulfosalicylic Acid Mixture)
DOT Hazard Class: 8
DOT Subsidiary Risk: NA
DOT ID Number: UN3261
DOT Packing Group: III
I.C.A.O.:
I.C.A.O. Proper Shipping Name: Corrosive Solid, Acidic, Organic, N.O.S. (Sulfosalicylic Acid Mixture)
ICAO Hazard Class: 8
ICAO Subsidiary Risk: NA
ICAO ID Number: UN3261
ICAO Packing Group: III
I.M.O.:
I.M.O. Proper Shipping Name: Corrosive Solid, Acidic, Organic, N.O.S. (Sulfosalicylic Acid Mixture)
I.M.O. Hazard Class: 8
I.M.O. Subsidiary Risk: NA
I.M.O. ID Number: UN3261
I.M.O. Packing Group: III
Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

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World Headquarters
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P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Date Printed 2/23/09
MSDS No: M00036

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Acid Reagent
Catalog Number: 212699

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M00036
Chemical Name: Disulfuric Acid, Dipotassium Salt
CAS No.: 7790-62-7
Chemical Formula: $K_2S_2O_7$
Chemical Family: Inorganic Salt
Hazard: Causes eye burns.
Date of MSDS Preparation:
Day: 03
Month: December
Year: 2007

2. COMPOSITION / INFORMATION ON INGREDIENTS

Potassium Pyrosulfate
CAS No.: 7790-62-7
TSCA CAS Number: 7790-62-7
Percent Range: 100.0
Percent Range Units: weight / weight
LD50: Oral rat LD50 = 2340 mg/kg
LC50: None reported
TLV: Not established
PEL: Not established
Hazard: Causes eye burns.

3. HAZARDS IDENTIFICATION

Emergency Overview:
Appearance: White powder
Odor: Not determined
CAUSES EYE BURNS MAY CAUSE SKIN AND RESPIRATORY TRACT IRRITATION

HMIS:
Health: 3
Flammability: 0
Reactivity: 0
Protective Equipment: X - See protective equipment, Section 8.

Spill Response Notice:
Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance.
Containment Technique: Stop spilled material from being released to the environment. Cover spilled solid material with sand or other inert material.
Clean-up Technique: Scoop up spilled material into a large beaker and dissolve with water. Adjust to a pH between 6 and 9 with an alkali, such as soda ash or sodium bicarbonate. Flush reacted material to the drain with a large excess of water. Decontaminate the area of the spill with a soap solution.
Evacuation Procedure: Evacuate local area (15 foot radius or as directed by your facility's emergency response plan) when: a pound or more of loose powder is spilled. If conditions warrant, increase the size of the evacuation.
Special Instructions (for accidental release): Not applicable
304 EHS RQ (40 CFR 355): Not applicable
D.O.T. Emergency Response Guide Number: None

7. HANDLING / STORAGE

Handling: Avoid contact with eyes skin Do not breathe dust. Wash thoroughly after handling. Maintain general industrial hygiene practices when using this product.
Storage: Keep away from: reducers Protect from: moisture
Flammability Class: Not applicable

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Have an eyewash station nearby. Use general ventilation to minimize exposure to mist, vapor or dust. Maintain general industrial hygiene practices when using this product.
Personal Protective Equipment:
Eye Protection: safety glasses with top and side shields
Skin Protection: disposable latex gloves
Inhalation Protection: adequate ventilation
Precautionary Measures: Avoid contact with: eyes skin Do not breathe: dust Wash thoroughly after handling.
TLV: Not established
PEL: Not established

9. PHYSICAL / CHEMICAL PROPERTIES

Appearance: White powder
Physical State: Solid
Molecular Weight: 254.0
Odor: Not determined
pH: of 5% solution = 1.0
Vapor Pressure: Not applicable
Vapor Density (air = 1): Not applicable
Boiling Point: Not applicable
Melting Point: 325°C 617°F
Specific Gravity (water = 1): 2.25
Evaporation Rate (water = 1): Not applicable
Volatile Organic Compounds Content: Not applicable
Partition Coefficient (n-octanol / water): Not available

D.O.T. Proper Shipping Name: Not Currently Regulated
--
DOT Hazard Class: NA
DOT Subsidiary Risk: NA
DOT ID Number: NA
DOT Packing Group: NA

I.C.A.O.:
I.C.A.O. Proper Shipping Name: Not Currently Regulated
--
ICAO Hazard Class: NA
ICAO Subsidiary Risk: NA
ICAO ID Number: NA
ICAO Packing Group: NA

I.M.O.:
I.M.O. Proper Shipping Name: Not Currently Regulated
--
I.M.O. Hazard Class: NA
I.M.O. Subsidiary Risk: NA
I.M.O. ID Number: NA
I.M.O. Packing Group: NA

Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

U.S. Federal Regulations:
O.S.H.A.: This product meets the criteria for a hazardous substance as defined in the Hazard Communication Standard. (29 CFR 1910.1200)
E.P.A.:
S.A.R.A. Title III Section 311/312 Categorization (40 CFR 370): Immediate (Acute) Health Hazard
S.A.R.A. Title III Section 313 (40 CFR 372): This product does NOT contain any chemical subject to the reporting requirements of Section 313 of Title III of SARA.
--
302 (EHS) TPQ (40 CFR 355): Not applicable
304 CERCLA RQ (40 CFR 302.4): Not applicable
304 EHS RQ (40 CFR 355): Not applicable
Clean Water Act (40 CFR 116.4): Not applicable
RCRA: Contains no RCRA regulated substances.
C.P.S.C.: Not applicable

State Regulations:
California Prop. 65: No Prop. 65 listed chemicals are present in this product.
Identification of Prop. 65 Ingredient(s): None
California Perchlorate Rule CCR Title 22 Chap 33:

Trade Secret Registry: Not applicable

National Inventories:
U.S. Inventory Status: TSCA Listed: Yes
TSCA CAS Number: 7790-62-7

16. OTHER INFORMATION

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

BASIC CHEMICAL SOLUTIONS

PART I *What is the material and what do I need to know in an emergency?*

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED): **BCS SULFURIC ACID (>51%)**

CHEMICAL NAME/CLASS: Sulfuric Acid Solution

PRODUCT USE: Neutralization, metal processing, battery acid.

SUPPLIER/MANUFACTURER'S NAME: **BASIC CHEMICAL SOLUTIONS**

ADDRESS: **Corporate Office**
525 Seaport Blvd.
Redwood City, CA 94063

BUSINESS PHONE: 800-411-4227

EMERGENCY PHONE: **CHEMTREC**: 800-424-9300

DATE OF PREPARATION: February 16, 2004

DATE OF REVISION: April 30, 2008

Si usted no entiende las Hojas de Informacion de Seguridad sobre Materials, busque a alguien para que se la explique a usted en detalle.

(If you do not understand the Material Safety Data Sheet, find someone to explain it to you in detail.)

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	%w/w	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA			
			TLV mg/m^3	STEL mg/m^3	PEL mg/m^3	STEL mg/m^3	IDLH	OTHER mg/m^3
Sulfuric Acid	7664-93-9	>51	1 mg/m^3	10	1 mg/m^3	3 mg/m^3	15 mg/m^3	NA
Water and other ingredients. The other ingredients are each present in less than 1 percent concentration in this product.		Balance	The components present in the balance of this product do not contribute any significant, additional hazards. All hazard information pertinent to this product has been presented in the remaining sections of this Material Safety Data Sheet, per the requirements of Federal Occupational Safety and Health Hazard Communication Standard (29 CFR 1910.1200).					

NE = Not Established. C = Ceiling Limit. See Section 16 for Definitions of Terms Used.
NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This product is a clear solution. Danger! Extremely corrosive. Causes sever burns. Reacts with water. Harmful if ingested or inhaled, can be fatal. In the event of fire or spill, adequate precautions must be taken. This product may decompose to produce a variety of compounds (i.e. carbon monoxide, carbon dioxide and oxides of sulfur). Flammable hydrogen gas can evolve when in contact with most metals. Emergency responders must wear the proper personal protective equipment suitable for the situation to which they are responding. Transport in approved vehicles and containers.

3. HAZARD IDENTIFICATION (Continued)

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant routes of occupational overexposure are inhalation and contact with skin and eyes. The symptoms of overexposure to this product are as follows:

INHALATION: If mists or sprays of this solution are inhaled, this product may cause pulmonary irritation, irritation of the mucus membranes, coughing, and a sore throat. Inhalation of high concentrations of this product may cause damage to the tissues of the respiratory system, producing potentially fatal lung disorders (chemical pneumonitis and pulmonary edema) and erosion of the tooth enamel.

CONTACT WITH SKIN or EYES: Contact with the eyes can cause severe irritation, eye burns and permanent eye damage. Contact with the skin can cause severe irritation, skin burns and permanent skin damage. Prolonged exposure may result in ulcerating burns which could leave scars.

SKIN ABSORPTION: Skin absorption is not anticipated to be a significant route of over-exposure to any component of this product.

INGESTION: Though ingestion is not anticipated to be a significant route of over-exposure to this product, if ingestion does occur burning and irritation of the mouth, throat, esophagus, and other tissues of the digestive system will occur immediately upon contact. Ingestion of large quantities may be fatal.

INJECTION: Though injection is not anticipated to be a significant route of over-exposure to this product, if it occurs, may cause local reddening, tissue swelling, and discomfort.

HAZARDOUS MATERIAL INFORMATION SYSTEM

HEALTH	(BLUE	3
FLAMMABILITY	(RED	0
REACTIVITY	(YELLOW	2
PROTECTIVE		D

EYES	RESPIRATOR	HAND	BODY
	SEE SECTION		

For routine industrial applications

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**.

ACUTE: This solution is corrosive, and can burn and damage eyes, skin, mucous membranes, and any other exposed tissue. If inhaled, irritation of the respiratory system may occur, with coughing, and breathing difficulty. Though unlikely to occur during occupational use, ingestion or injection of large quantities may be fatal.

CHRONIC: This product contains ingredients that are considered to be probable or suspected human carcinogens (see Section 11).

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

SKIN EXPOSURE: If the product contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 15 minutes. Remove contaminated clothing, taking goggles off last. Victim must seek medical attention.

EYE EXPOSURE: If this product enters the eyes, open victim's eyes while under gentle running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Victim must seek immediate medical attention.

INHALATION: If vapors, mists, or sprays of this product are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Remove or cover gross contamination to avoid exposure to rescuers. If shortness of breath occurs, evaluate the possibility of bronchitis or pneumonitis. Chest x-ray and arterial blood gasses can be used to determined the presence of pulmonary edema. In severe causes, use of humidified oxygen and assisted ventilation including positive end expiratory pressure (PEEP) may be needed. Parenteral steroids may be useful in limiting the extent of pulmonary damage.

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, **do not induce vomiting**. Victim should rinse mouth with large amounts of water. Victim should drink 2-3 glasses of water to dilute the ingested material. Never induce vomiting or give diluents (water) to someone who is unconscious, having convulsions, or who cannot swallow. The use of gastric lavage is controversial. The removal of acid must be weighed against the risk of perforation or bleeding. If a large amount of acid (greater than 1ml /kg body weight) has been ingested , cautious gastric lavage is generally advised if the patient is alert and there is little risk of convulsions. Consultation with a gastroenterologist and/or surgeon is advised. Serious complications such as perforation or stricture of the esophagus may occur requiring care by specialist. Laryngeal edema may develop requiring intubation or tracheostomy.

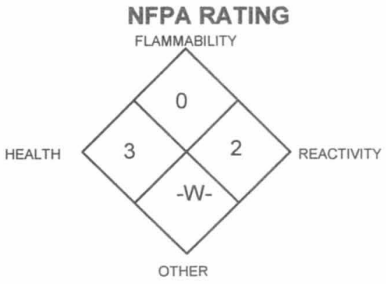
Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to health professional with victim.

5. FIRE-FIGHTING MEASURES

FLASH POINT, °C (method): Not flammable.
AUTOIGNITION TEMPERATURE, °C: Not flammable.
FLAMMABLE LIMITS (in air by volume, %): Lower (LEL): Not applicable.
Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS:

Water Spray: YES (Expect reaction)
Foam: YES
Halon: YES
Carbon Dioxide: YES
Dry Chemical: YES
Other: NO.



UNUSUAL FIRE AND EXPLOSION HAZARDS: This product is corrosive, and presents a significant contact hazard to fire-fighters. For large fires, flood fire area from a distance. Expect a reaction with water. Do not let solid stream of water contact spilled materials. When involved in a fire, this material may decompose and produce irritating fumes and toxic gases (including carbon monoxide, carbon dioxide and oxides of sulfur).

Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural fire fighters must wear Self-Contained Breathing Apparatus and full protective equipment. If possible, prevent run-off water from entering storm drains, bodies of water, or other environmentally sensitive areas.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a spill, clear the affected area, protect people, and respond with trained personnel.

The proper personal protective equipment for incidental releases (e.g.-1 L of the product released in a well-ventilated area) use impermeable gloves, specific for the material handled, goggles, face shield, and appropriate body protection. In the event of a large release, use impermeable gloves, specific for the material handled, chemically resistant suit and boots, and hard-hat. Self Contained Breathing Apparatus or respirator may be required where engineering controls are not adequate or conditions for potential exposure exist. When respirators are required, Select NIOSH/MSHA approved based on actual or potential airborne concentrations in accordance with latest OSHA and/or ANSI recommendations.
Absorb spilled liquid with polypads or other suitable absorbent materials. Neutralize residue with lime or soda ash or other acid neutralizing agent. Decontaminate the area thoroughly. Test area with litmus paper to confirm neutralization. Place all spill residue in a suitable container. Dispose of in accordance with Federal, State and local hazardous waste disposal regulations (see Section 13 – Disposal Considerations.)

PART III *How can I prevent hazardous situations from occurring*

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash hands after handling this product. Do not eat or drink while handling this material. Remove contaminated clothing immediately. Use ventilation and other engineering controls to minimize potential exposure to this product.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Avoid breathing mists or sprays generated by this product. Use in a well-ventilated location.

For Non-Bulk Containers: Cannot be handled in metal containers. Open containers slowly, on a stable surface. Containers of this product must be properly labeled. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Material should be stored in secondary containers, or in a diked area, as appropriate. Store containers away from incompatible chemicals. Keep container tightly closed when not in use. Wash thoroughly after using this material. Storage areas should be made of fire-resistant materials. If appropriate, post warning signs in storage and use areas. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged.

Empty containers may contain residual liquid. Therefore, empty containers should be handled with care.

7. HANDLING and STORAGE (Continued)

Bulk Containers: Cannot be handled in metal containers. All tanks and pipelines which contain this material must be labeled. Perform routine maintenance on tanks or pipelines which contain this product. Report all leaks immediately to the proper personnel.

Tank Car Shipments: *Cannot be transported in unlined cold rolled, stainless steel or rubber lined tank cars. Determine compatibility with the vessel prior to shipment.* Tank cars carrying this product should be loaded and unloaded in strict accordance with tank-car manufacturer's recommendation and all established on-site safety procedures. Appropriate personal protective equipment must be used (see Section 8, Engineering Controls and Personal Protective Equipment.). All loading and unloading equipment must be inspected, prior to each use. Loading and unloading operations must be attended, at all times. Tank cars must be level, brakes must be set or wheels must be locked or blocked prior to loading or unloading. Tank car (for loading) or storage tank (for unloading) must be verified to be correct for receiving this product and be properly prepared, prior to starting the transfer operations. Hoses must be verified to be clean and free of incompatible chemicals, prior to connection to the tank car or vessel. Valves and hoses must be verified to be in the correct positions, before starting transfer operations. A sample (if required) must be taken and verified (if required) prior to starting transfer operations. All lines must be blown-down and purged before disconnecting them from the tank car or vessel.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Always use this product in areas where adequate ventilation is provided. Decontaminate equipment before maintenance begins by a triple-rinse with water followed, if necessary, by using acid neutralizing agent and an additional rinse. Collect all rinsates and dispose of according to applicable Federal, State, or local procedures.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: If required use a corrosion-resistant ventilation system separate from other exhaust ventilation systems to ensure that there is no potential for overexposure to sprays, or mists of this product and that exposures are below those in section 2. Ensure eyewash/safety shower stations are available near areas where this product is used.

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below exposure limits listed in Section 2 (Composition and Information on Ingredients). If respiratory protection is needed, use only protection authorized in 29 CFR 1910.134, or applicable State regulations. If adequate ventilation is not available or if there is potential for airborne exposure above the exposure limits (listed in Section 2) a respirator may be worn up to respirator exposure limitations, check with respirator equipment manufactures recommendations/limitations. For a higher level of protection use positive pressure supplied air respiration protection or Self Contained Breathing Apparatus or if oxygen levels are below 19.5% or are unknown.

EMERGENCY OR PLANNED ENTRY INTO UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS:
Positive pressure, full-facepiece Self Contained Breathing Apparatus; or positive pressure, full-facepiece Self Contained Breathing Apparatus with an auxiliary positive pressure Self Contained Breathing Apparatus.

EYE PROTECTION: Chemical Splash goggles and Full Face-shields are strongly recommended when the operation can generate splashes, sprays or mists.

HAND PROTECTION: Wear appropriate gloves for routine industrial use. Use appropriate gloves for spill response, as stated in Section 6 of this MSDS (Accidental Release Measures).

BODY PROTECTION: Use body protection appropriate for task. Cover-all, rubber aprons, or chemical protective clothing made from natural rubber or other appropriate materials are generally acceptable, depending upon the task.

9. PHYSICAL and CHEMICAL PROPERTIES

Physical and chemical properties for Sulfuric Acid.

Appearance: Clear oily liquid.
Odor: Odorless.
Solubility: Miscible with water, liberates much heat.
Specific Gravity: 1.84 (98%), 1.71 (78%), 1.40 (50%)
pH: 1 N solution (ca. 5% w/w) = 0.3; 0.1 N solution (ca. 0.5% w/w) = 1.2; 0.01 N solution (ca. 0.05% w/w) = 2.1.
% Volatiles by volume @ 21C (70F): No information found.
Boiling Point: ca. 290C (ca. 554F) (decomposes at 340C)
Melting Point: 3C (100%), -32C (93%), -38C (78%), -64C (65%).
Vapor Density (Air=1): 3.4
Vapor Pressure (mm Hg): 1 @ 145.8C (295F)
Evaporation Rate (BuAc=1): No information found.

ODOR THRESHOLD: Not available.
APPEARANCE AND COLOR: No odor.
HOW TO DETECT THIS SUBSTANCE (warning properties): Litmus paper will turn red upon contact with even low concentrations of this solution.

10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: Thermal decomposition products of this solution can include carbon monoxide, carbon dioxide and oxides of sulfur.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: This product reacts with bases, reducing agents, alkali metals, carbides, cyanides, sulfides and metal powders. Do not mix this product with sodium hypochlorite, sodium bisulfite, Chlorine Sanitizers or Chlorinated Cleaners – a deadly gas can be formed.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid exposure or contact to extreme temperatures and incompatible chemicals.

PART IV *Is there any other useful information about this material?*

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: Additional toxicology information for components greater than 1 percent in concentration is provided below.
SULFURIC ACID:
LD_{50} (oral, rat) 2140 mg/kg LC_{50} (rat) 510 mg/m2 /2 hrs LC_{50} (rat) 347 ppm/1 hr

SUSPECTED CANCER AGENT: The components of this product are not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA; and are not considered to be, nor suspected to be, cancer-causing agents by these agencies.

BCS,LLC only adds water to produce lower concentrations of sulfuric acid. The following quote is from a 93% sulfuric acid MSDS dated 5/7/97 from Rhodia Inc., who is a producer of sulfuric acid and is regarding cancer and strong acid mists. "The International Agency for Research on cancer (IARC) has classified strong inorganic acid mists containing sulfuric as a known human carcinogen (IARC Category 1). This classification applies to sulfuric acid when it is generated as a mist. There is still debate in the scientific community whether the studies reviewed by IARC adequately controlled for confounding occupational exposures and personal habits such as smoking and alcohol consumption. A few epidemiology studies have suggested a possible association between sulfuric acid exposure and laryngeal or lung cancer; however, in all these studies, workers were exposed to many other chemicals, some of which are recognized carcinogens, such as diethylsulfate and nickel. Considering the multiple chemical exposures and other limitations of the studies we (Rhodia Inc.) disagree with IARC's conclusions that a cause and effect relationship between cancer and exposure to strong inorganic acid mist containing sulfuric acid has been demonstrated."

11. TOXICOLOGICAL INFORMATION (Continued)

IRRITANCY OF PRODUCT: This product is severely irritating to contaminated tissue.

SENSITIZATION TO THE PRODUCT: No component of this product is known to be a sensitizer.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product and its components on the human reproductive system.

Mutagenicity: This product is not reported to produce mutagenic effects in humans.
Embryotoxicity: This product is not reported to produce embryotoxic effects in humans.
Teratogenicity: This product is not reported to cause teratogenic effects in humans.
Reproductive Toxicity: This product is not reported to cause reproductive effects in humans.

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

BIOLOGICAL EXPOSURE INDICES: Currently there are no Biological Exposure Indices (BEIs) associated with the components of this product.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE Skin disorders can be aggravated by over-exposure to this product. Inhalation of this products mists may aggravate respiratory conditions.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate over-exposure to this product.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: No chemical fate data found.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: This product is harmful or fatal to plant and animal life if released into the environment. As with all chemicals, work practices should be aimed at eliminating environmental releases. Refer to Section 11 (Toxicological Information) for further toxicological data.

EFFECT OF CHEMICAL ON AQUATIC LIFE The toxicity of sulfuric acid to fish is dependent on the resulting pH of the water. lethality at a ph of 5.0 or below. Required to cause lethality varies depending on the hardness of the water (hard water has some buffering capacity) and the species of fish (some fish are more resistant to the effects of acidity) McKee, JE, and Wolf, HA (Editors) Water Quality Criteria, 2nd ed., Publications No. 3-A, p. 279, California State Water Quality Resources Control Board, Sacramento, CA (Rev. 1963).

As with all chemicals, work practices should be aimed at eliminating environmental releases.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority.

EPA WASTE NUMBER: D002 (Characteristic, Corrosivity), applicable to wastes consisting only of this solution.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME:	Sulfuric Acid with more than 51% acid
HAZARD CLASS NUMBER and DESCRIPTION:	8 (Corrosive Material)
UN IDENTIFICATION NUMBER:	UN 1830
PACKING GROUP:	II
DOT LABEL(S) REQUIRED:	Corrosive

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): 137

14. TRANSPORTATION INFORMATION—(Continued)

MARINE POLLUTANT: This product does not contain any components which are designated by the Department of Transportation to be Marine Pollutants. (49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

Note: The latest DOT information is provided, please verify all DOT information as it is subject to change without notice.

15. REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: The components of this product subject to the reporting requirements of Section 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act are as follows.

COMPONENT	SARA 302	SARA 304	SARA 313
Sulfuric Acid	Yes	Yes	No

SARA Threshold Planning Quantity: NA

TSCA INVENTORY STATUS: The components of this product are listed on the TSCA Inventory.

CERCLA REPORTABLE QUANTITY (RQ): Sulfuric Acid = 1000 lbs,
OTHER FEDERAL REGULATIONS: Not applicable.

STATE REGULATORY INFORMATION: Not determined.

CALIFORNIA PROPOSITION 65: No component of this product is on the California Proposition 65 lists.

LABELING (Precautionary Statements): **DANGER!** CORROSIVE MATERIAL! LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. MAY CAUSE LUNG DAMAGE. Do not get into eyes, on skin or clothing. Avoid breathing spray or mist. Do not take internally. Use with adequate ventilation and employ respiratory protection when exposed to the mist or spray. When handling, wear chemical splash goggles, face shield, rubber gloves and protective clothing. Do not transfer to unlabeled containers. Wash thoroughly after handling. Keep container closed when not in use. FIRST AID: In case of contact, immediately flush skin or eyes for at least 15 minutes. If inhaled, move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Do not induce vomiting. IN CASE OF FIRE: Use water, dry chemical, CO_2, or alcohol foam. IN CASE OF SPILL: Neutralize residue with acid neutralizing agent. Refer to MSDS for additional information.

TARGET ORGANS: Skin, eyes and respiratory system.
WHMIS SYMBOLS:

D1A- Poisonous and Infectious Materials
Very Toxic Materials

E- Corrosive Material

16. OTHER INFORMATION

INFORMATION SOURCE: CHEMICAL SAFETY ASSOCIATES, Inc.
Rhodia Inc.

PREPARED BY: BASIC CHEMICAL SOLUTIONS

DEFINITIONS OF TERMS

15. OTHER INFORMATION (Continued)

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

CAS #: This is the Chemical Abstract Service Number which uniquely identifies each constituent. It is used for computer-related searching.

EXPOSURE LIMITS IN AIR:
ACGIH - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits.
TLV - Threshold Limit Value - an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour **Time Weighted Average (TWA)**, the 15-minute **Short Term Exposure Limit**, and the instantaneous **Ceiling Level**. Skin adsorption effects must also be considered.
OSHA - U.S. Occupational Safety and Health Administration.
PEL - Permissible Exposure Limit - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL which was vacated by Court Order.
IDLH - Immediately Dangerous to Life and Health - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. **O**ccupational **S**afety and **H**ealth **A**dministration (**OSHA**). NIOSH issues exposure guidelines called **R**ecommended **E**xposure **L**evels (**RELs**). When no exposure guidelines are established, an entry of **NE** is made for reference.

FLAMMABILITY LIMITS IN AIR:
Much of the information related to fire and explosion is derived from the **N**ational **F**ire **P**rotection **A**ssociation (**NFPA**). LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:
Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD_{50}** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC_{50}** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m^3** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Data from several sources are used to evaluate the cancer-causing potential of the material. The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause death. **BEI** - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

REGULATORY INFORMATION:
This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Other acronyms used are: **Superfund Amendments and Reauthorization Act (SARA)**; the **Toxic Substance Control Act (TSCA)**; Marine Pollutant status according to the **DOT**; California's Safe Drinking Water Act (**Proposition 65**); the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund)**; and various state regulations. This section also includes information on the precautionary warnings which appear on the materials package label.

World Headquarters
Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Date Printed 2/23/09
MSDS No: M00368

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Buffer Solution pH 4.01 ± 0.02
Catalog Number: 2283449

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M00368
Chemical Name: Not applicable
CAS No.: Not applicable
Chemical Formula: Not applicable
Chemical Family: Not applicable
Hazard: Practically non-toxic.
Date of MSDS Preparation:
Day: 09
Month: February
Year: 2007

2. COMPOSITION / INFORMATION ON INGREDIENTS

Demineralized Water
CAS No.: 7732-18-5
TSCA CAS Number: 7732-18-5
Percent Range: >95.0
Percent Range Units: weight / weight
LD50: None reported
LC50: None reported
TLV: Not established
PEL: Not established
Hazard: No effects anticipated.

Other components, each
CAS No.: Not applicable
TSCA CAS Number: Not applicable
Percent Range: < 1.0
Percent Range Units: volume / volume
LD50: Not applicable
LC50: Not applicable
TLV: Not established
PEL: Not established
Hazard: Any ingredient(s) of this product listed as "Other component(s)" is not considered a health hazard to the user of this product.

Potassium Acid Phthalate
CAS No.: 877-24-7
TSCA CAS Number: 877-24-7

Skin Contact (First Aid): Wash skin with soap and plenty of water.
Ingestion (First Aid): Give large quantities of water. Call physician immediately.
Inhalation: None required.

5. FIRE FIGHTING MEASURES

Flammable Properties: Material will not burn.
Flash Point: Not applicable
Method: Not applicable
Flammability Limits:
Lower Explosion Limits: Not applicable
Upper Explosion Limits: Not applicable
Autoignition Temperature: Not applicable
Hazardous Combustion Products: Not applicable
Fire / Explosion Hazards: None reported
Static Discharge: None reported.
Mechanical Impact: None reported
Extinguishing Media: Use media appropriate to surrounding fire conditions
Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:
Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance.
Containment Technique: Stop spilled material from being released to the environment.
Clean-up Technique: Cover spilled material with an alkali, such as soda ash or sodium bicarbonate. Scoop up slurry into a large beaker. Adjust to a pH between 6 and 9 with an alkali, such as soda ash or sodium bicarbonate. Flush reacted material to the drain with a large excess of water. Decontaminate the area of the spill with a soap solution.
Evacuation Procedure: Evacuate as needed to perform spill clean-up. If conditions warrant, increase the size of the evacuation.
Special Instructions (for accidental release): Not applicable
304 EHS RQ (40 CFR 355): Not applicable
D.O.T. Emergency Response Guide Number: None

7. HANDLING / STORAGE

Handling: Avoid contact with eyes Wash thoroughly after handling.
Storage: Keep container tightly closed when not in use.
Flammability Class: Not applicable

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Maintain general industrial hygiene practices when using this product.
Personal Protective Equipment:
Eye Protection: safety glasses with top and side shields
Skin Protection: disposable latex gloves
Inhalation Protection: adequate ventilation

Ingredient Ecological Information: --
No ecological data available for the ingredients of this product.

13. DISPOSAL CONSIDERATIONS

EPA Waste ID Number: None
Special Instructions (Disposal): Adjust to a pH between 6 and 9 with an alkali, such as soda ash or sodium bicarbonate. Open cold water tap completely, slowly pour the reacted material to the drain.
Empty Containers: Rinse three times with an appropriate solvent. Dispose of empty container as normal trash.
NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

D.O.T.:
D.O.T. Proper Shipping Name: Not Currently Regulated
--
DOT Hazard Class: NA
DOT Subsidiary Risk: NA
DOT ID Number: NA
DOT Packing Group: NA
I.C.A.O.:
I.C.A.O. Proper Shipping Name: Not Currently Regulated
--
ICAO Hazard Class: NA
ICAO Subsidiary Risk: NA
ICAO ID Number: NA
ICAO Packing Group: NA
I.M.O.:
I.M.O. Proper Shipping Name: Not Currently Regulated
--
I.M.O. Hazard Class: NA
I.M.O. Subsidiary Risk: NA
I.M.O. ID Number: NA
I.M.O. Packing Group: NA
Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

U.S. Federal Regulations:
O.S.H.A.: This product does not meet the criteria for a hazardous substance as defined in the Hazard Communication Standard. (29 CFR 1910.1200)
E.P.A.:
S.A.R.A. Title III Section 311/312 Categorization (40 CFR 370): This product is not hazardous under 29 CFR.1910.1200 and therefore is not covered by Title III under SARA.
S.A.R.A. Title III Section 313 (40 CFR 372): This product does NOT contain any chemical subject to the reporting requirements of Section 313 of Title III of SARA.

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(970) 669-3050

Date Printed 8/17/09
MSDS No: M00369

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Buffer Solution pH 7.00 ± 0.02
Catalog Number: 2283549

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M00369
Chemical Name: Not applicable
CAS No.: Not applicable
Chemical Formula: Not applicable
Chemical Family: Not applicable
Hazard: Practically non-toxic.
Date of MSDS Preparation:
Day: 24
Month: July
Year: 2009

2. COMPOSITION / INFORMATION ON INGREDIENTS

Potassium Phosphate, Monobasic
CAS No.: 7778-77-0
TSCA CAS Number: 7778-77-0
Percent Range: < 1.0
Percent Range Units: weight / weight
LD50: Oral rat LD50 = 7100 mg/kg
LC50: None reported
TLV: Not established
PEL: Not established
Hazard: May cause irritation.

Demineralized Water
CAS No.: 7732-18-5
TSCA CAS Number: 7732-18-5
Percent Range: >95.0
Percent Range Units: volume / volume
LD50: None reported
LC50: None reported
TLV: Not established
PEL: Not established
Hazard: No effects anticipated.

Other components, each
CAS No.: Not applicable
TSCA CAS Number: Not applicable
Percent Range: < 1.0
Percent Range Units: volume / volume
LD50: Not applicable
LC50: Not applicable
TLV: Not established
PEL: Not established
Hazard: Any ingredient(s) of this product listed as "Other component(s)" is not considered a health hazard to the user of this product.

Vapor Pressure: Not determined
Vapor Density (air = 1): Not determined
Boiling Point: ~100°C (~212°F)
Melting Point: ~0°C (~32°F)
Specific Gravity (water = 1): ~1.0
Evaporation Rate (water = 1): Not determined
Volatile Organic Compounds Content: Not applicable
Partition Coefficient (n-octanol / water): Not determined
Solubility:
Water: Soluble
Acid: Soluble
Other: Not determined
Metal Corrosivity:
Steel: Not determined
Aluminum: Not determined

10. STABILITY / REACTIVITY

Chemical Stability: Stable when stored under proper conditions.
Conditions to Avoid: Heat Evaporation
Reactivity / Incompatibility: None reported
Hazardous Decomposition: None reported
Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Product Toxicological Data:
LD50: None reported
LC50: None reported
Dermal Toxicity Data: None reported
Skin and Eye Irritation Data: None reported
Mutation Data: None reported
Reproductive Effects Data: None reported
Ingredient Toxicological Data: --
No toxicological data available for the ingredients of this product.

12. ECOLOGICAL INFORMATION

Product Ecological Information: --
No ecological data available for this product.
Ingredient Ecological Information: --
No ecological data available for the ingredients of this product.

13. DISPOSAL CONSIDERATIONS

EPA Waste ID Number: None
Special Instructions (Disposal): Open cold water tap completely, slowly pour the material to the drain.
Empty Containers: Rinse three times with an appropriate solvent. Dispose of empty container as normal trash.
NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

D.O.T.:
D.O.T. Proper Shipping Name: Not Currently Regulated
--
DOT Hazard Class: NA

World Headquarters
Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Legend:

NA - Not Applicable	w/w - weight/weight
ND - Not Determined	w/v - weight/volume
NV - Not Available	v/v - volume/volume

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

World Headquarters
Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Date Printed 2/23/09
MSDS No: M00369

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Buffer Solution pH 7.00 ± 0.02
Catalog Number: 2283549

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M00369
Chemical Name: Not applicable
CAS No.: Not applicable
Chemical Formula: Not applicable
Chemical Family: Not applicable
Hazard: Practically non-toxic.
Date of MSDS Preparation:
Day: 27
Month: February
Year: 2007

2. COMPOSITION / INFORMATION ON INGREDIENTS

Demineralized Water
CAS No.: 7732-18-5
TSCA CAS Number: 7732-18-5
Percent Range: >95.0
Percent Range Units: volume / volume
LD50: None reported
LC50: None reported
TLV: Not established
PEL: Not established
Hazard: No effects anticipated.

Other components, each
CAS No.: Not applicable
TSCA CAS Number: Not applicable
Percent Range: < 1.0
Percent Range Units: volume / volume
LD50: Not applicable
LC50: Not applicable
TLV: Not established
PEL: Not established
Hazard: Any ingredient(s) of this product listed as "Other component(s)" is not considered a health hazard to the user of this product.

2,4-Dinitrophenol
CAS No.: 51-28-5
TSCA CAS Number: 51-28-5

Eye Contact: Flush eyes with water. Call physician if irritation develops.
Skin Contact (First Aid): Wash skin with plenty of water.
Ingestion (First Aid): Give large quantities of water. Call physician immediately.
Inhalation: None required.

5. FIRE FIGHTING MEASURES

Flammable Properties: Material will not burn.
Flash Point: Not applicable
Method: Not applicable
Flammability Limits:
Lower Explosion Limits: Not applicable
Upper Explosion Limits: Not applicable
Autoignition Temperature: Not applicable
Hazardous Combustion Products: None reported
Fire / Explosion Hazards: None reported
Static Discharge: None reported.
Mechanical Impact: None reported
Extinguishing Media: Use media appropriate to surrounding fire conditions
Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:
Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance.
Containment Technique: Stop spilled material from being released to the environment.
Clean-up Technique: Absorb spilled liquid with non-reactive sorbent material. Place material in a plastic bag. Mark bag 'Non-hazardous trash', and dispose of as normal refuse.
Evacuation Procedure: Evacuate as needed to perform spill clean-up. If conditions warrant, increase the size of the evacuation.
Special Instructions (for accidental release): Not applicable
304 EHS RQ (40 CFR 355): Not applicable
D.O.T. Emergency Response Guide Number: None

7. HANDLING / STORAGE

Handling: Avoid contact with eyes Wash thoroughly after handling.
Storage: Protect from: heat Keep container tightly closed when not in use.
Flammability Class: Not applicable

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Maintain general industrial hygiene practices when using this product.
Personal Protective Equipment:
Eye Protection: safety glasses with top and side shields
Skin Protection: Not applicable
Inhalation Protection: adequate ventilation
Precautionary Measures: Avoid contact with: eyes Wash thoroughly after handling.

No ecological data available for the ingredients of this product.

13. DISPOSAL CONSIDERATIONS

EPA Waste ID Number: None
Special Instructions (Disposal): Open cold water tap completely, slowly pour the material to the drain.
Empty Containers: Rinse three times with an appropriate solvent. Dispose of empty container as normal trash.
NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

D.O.T.:
D.O.T. Proper Shipping Name: Not Currently Regulated
--
DOT Hazard Class: NA
DOT Subsidiary Risk: NA
DOT ID Number: NA
DOT Packing Group: NA
I.C.A.O.:
I.C.A.O. Proper Shipping Name: Not Currently Regulated
--
ICAO Hazard Class: NA
ICAO Subsidiary Risk: NA
ICAO ID Number: NA
ICAO Packing Group: NA
I.M.O.:
I.M.O. Proper Shipping Name: Not Currently Regulated
--
I.M.O. Hazard Class: NA
I.M.O. Subsidiary Risk: NA
I.M.O. ID Number: NA
I.M.O. Packing Group: NA
Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

U.S. Federal Regulations:
O.S.H.A.: This product does not meet the criteria for a hazardous substance as defined in the Hazard Communication Standard. (29 CFR 1910.1200)
E.P.A.:
S.A.R.A. Title III Section 311/312 Categorization (40 CFR 370): This product is not hazardous under 29 CFR.1910.1200 and therefore is not covered by Title III under SARA.
S.A.R.A. Title III Section 313 (40 CFR 372): This product contains a chemical(s) subject to the reporting requirements of Section 313 of Title III of SARA.
2,4-Dinitrophenol, CAS RN 51-28-5
302 (EHS) TPQ (40 CFR 355): Not applicable

World Headquarters
Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Date Printed 2/23/09
MSDS No: M00370

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Buffer Solution pH 10.01 ± 0.02
Catalog Number: 2283649

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M00370
Chemical Name: Not applicable
CAS No.: Not applicable
Chemical Formula: Not applicable
Chemical Family: Not applicable
Hazard: May cause irritation.
Date of MSDS Preparation:
Day: 27
Month: February
Year: 2007

2. COMPOSITION / INFORMATION ON INGREDIENTS

Demineralized Water
CAS No.: 7732-18-5
TSCA CAS Number: 7732-18-5
Percent Range: > 99.0
Percent Range Units: volume / volume
LD50: None reported
LC50: None reported
TLV: Not established
PEL: Not established
Hazard: No effects anticipated.

Other components, each
CAS No.: Not applicable
TSCA CAS Number: Not applicable
Percent Range: < 1.0
Percent Range Units: volume / volume
LD50: Not applicable
LC50: Not applicable
TLV: Not established
PEL: Not established
Hazard: Any ingredient(s) of this product listed as "Other component(s)" is not considered a health hazard to the user of this product.

3. HAZARDS IDENTIFICATION

Upper Explosion Limits: Not applicable
Autoignition Temperature: Not applicable
Hazardous Combustion Products: None
Fire / Explosion Hazards: None reported
Static Discharge: None reported.
Mechanical Impact: None reported
Extinguishing Media: Use media appropriate to surrounding fire conditions
Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:
Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance.
Containment Technique: Stop spilled material from being released to the environment.
Clean-up Technique: Cover spilled material with a dry acid, such as citric or boric. Scoop up slurry into a large beaker. Adjust to a pH between 6 and 9 with an acid, such as sulfuric or citric. Flush reacted material to the drain with a large excess of water.
Evacuation Procedure: Evacuate as needed to perform spill clean-up. If conditions warrant, increase the size of the evacuation.
Special Instructions (for accidental release): Not applicable
304 EHS RQ (40 CFR 355): Not applicable
D.O.T. Emergency Response Guide Number: None

7. HANDLING / STORAGE

Handling: Avoid contact with eyes Wash thoroughly after handling. Maintain general industrial hygiene practices when using this product.
Storage: Protect from: heat Keep container tightly closed when not in use.
Flammability Class: Not applicable

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Maintain general industrial hygiene practices when using this product.
Personal Protective Equipment:
Eye Protection: safety glasses with top and side shields
Skin Protection: disposable latex gloves lab coat
Inhalation Protection: adequate ventilation
Precautionary Measures: Avoid contact with: eyes Wash thoroughly after handling.
TLV: Not established
PEL: Not established

9. PHYSICAL / CHEMICAL PROPERTIES

Appearance: Clear, blue
Physical State: Liquid
Molecular Weight: Not applicable
Odor: None
pH: 10.0

NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

D.O.T.:
D.O.T. Proper Shipping Name: Not Currently Regulated
--
DOT Hazard Class: NA
DOT Subsidiary Risk: NA
DOT ID Number: NA
DOT Packing Group: NA
I.C.A.O.:
I.C.A.O. Proper Shipping Name: Not Currently Regulated
--
ICAO Hazard Class: NA
ICAO Subsidiary Risk: NA
ICAO ID Number: NA
ICAO Packing Group: NA
I.M.O.:
I.M.O. Proper Shipping Name: Not Currently Regulated
--
I.M.O. Hazard Class: NA
I.M.O. Subsidiary Risk: NA
I.M.O. ID Number: NA
I.M.O. Packing Group: NA
Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

U.S. Federal Regulations:
O.S.H.A.: This product meets the criteria for a hazardous substance as defined in the Hazard Communication Standard. (29 CFR 1910.1200)
E.P.A.:
S.A.R.A. Title III Section 311/312 Categorization (40 CFR 370): Immediate (Acute) Health Hazard
S.A.R.A. Title III Section 313 (40 CFR 372): This product does NOT contain any chemical subject to the reporting requirements of Section 313 of Title III of SARA.
--
302 (EHS) TPQ (40 CFR 355): Not applicable
304 CERCLA RQ (40 CFR 302.4): Not applicable
304 EHS RQ (40 CFR 355): Not applicable
Clean Water Act (40 CFR 116.4): Not applicable
RCRA: Contains no RCRA regulated substances.
C.P.S.C.: Not applicable
State Regulations:
California Prop. 65: No Prop. 65 listed chemicals are present in this product.
Identification of Prop. 65 Ingredient(s): None
California Perchlorate Rule CCR Title 22 Chap 33:

MATERIAL SAFETY DATA SHEET

Diesel Fuel (All Types) **MSDS No. 9909**

EMERGENCY OVERVIEW
CAUTION!
OSHA/NFPA COMBUSTIBLE LIQUID - SLIGHT TO MODERATE IRRITANT
EFFECTS CENTRAL NERVOUS SYSTEM
HARMFUL OR FATAL IF SWALLOWED

Moderate fire hazard. Avoid breathing vapors or mists. May cause dizziness and drowsiness. May cause moderate eye irritation and skin irritation (rash). Long-term, repeated exposure may cause skin cancer.
If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs).

NFPA 704 (Section 16)

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

EMERGENCY TELEPHONE NUMBER (24 hrs): **CHEMTREC (800) 424-9300**
COMPANY CONTACT (business hours): Corporate Safety (732) 750-6000
MSDS INTERNET WEBSITE: www.hess.com (See Environment, Health, Safety & Social Responsibility)

SYNONYMS: Ultra Low Sulfur Diesel (ULSD); Low Sulfur Diesel; Motor Vehicle Diesel Fuel; Diesel Fuel #2; Dyed Diesel Fuel; Non-Road, Locomotive and Marine Diesel Fuel; Tax-exempt Diesel Fuel

See Section 16 for abbreviations and acronyms.

2. COMPOSITION and CHEMICAL INFORMATION ON INGREDIENTS

INGREDIENT NAME (CAS No.)	CONCENTRATION PERCENT BY WEIGHT
Diesel Fuel (68476-34-6)	100
Naphthalene (91-20-3)	Typically < 0.01

A complex mixture of hydrocarbons with carbon numbers in the range C9 and higher. Diesel fuel may be dyed (red) for tax purposes. May contain a multifunctional additive.

3. HAZARDS IDENTIFICATION

EYES
Contact with liquid or vapor may cause mild irritation.

SKIN
May cause skin irritation with prolonged or repeated contact. Practically non-toxic if absorbed following acute (single) exposure. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed.

INGESTION
The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

INHALATION
Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

CHRONIC EFFECTS and CARCINOGENICITY
Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information.

IARC classifies whole diesel fuel exhaust particulates as probably carcinogenic to humans (Group 2A). NIOSH regards whole diesel fuel exhaust particulates as a potential cause of occupational lung cancer based on animal studies and limited evidence in humans.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash).

4. FIRST AID MEASURES

EYES
In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

SKIN
Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops.

INGESTION
DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

INHALATION
Remove person to fresh air. If person is not breathing provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES:

FLASH POINT:	> 125 °F (> 52 °C) minimum PMCC
AUTOIGNITION POINT:	494 °F (257 °C)
OSHA/NFPA FLAMMABILITY CLASS:	2 (COMBUSTIBLE)
LOWER EXPLOSIVE LIMIT (%):	0.6
UPPER EXPLOSIVE LIMIT (%):	7.5

FIRE AND EXPLOSION HAZARDS
Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

EXTINGUISHING MEDIA
SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, or Halon.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

FIRE FIGHTING INSTRUCTIONS

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

See Section 16 for the NFPA 704 Hazard Rating.

6. ACCIDENTAL RELEASE MEASURES

ACTIVATE FACILITY'S SPILL CONTINGENCY OR EMERGENCY RESPONSE PLAN.

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

7. HANDLING and STORAGE

HANDLING PRECAUTIONS

Handle as a combustible liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Diesel fuel, and in particular low and ultra low sulfur diesel fuel, has the capability of accumulating a static electrical charge of sufficient energy to cause a fire/explosion in the presence of lower flashpoint products such as gasoline. The accumulation of such a static charge occurs as the diesel flows through pipelines, filters, nozzles and various work tasks such as tank/container filling, splash loading, tank cleaning; product sampling; tank gauging; cleaning, mixing, vacuum truck operations, switch loading, and product agitation. There is a greater potential for static charge accumulation in cold temperature, low humidity conditions.

Documents such as 29 CFR OSHA 1910.106 "Flammable and Combustible Liquids, NFPA 77 Recommended Practice on Static Electricity, API 2003 "Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents and ASTM D4865 "Standard Guide for Generation and Dissipation of Static

Electricity in Petroleum Fuel Systems" address special precautions and design requirements involving loading rates, grounding, bonding, filter installation, conductivity additives and especially the hazards associated with "switch loading." ["Switch Loading" is when a higher flash point product (such as diesel) is loaded into tanks previously containing a low flash point product (such as gasoline) and the electrical charge generated during loading of the diesel results in a static ignition of the vapor from the previous cargo (gasoline).]

Note: When conductivity additives are used or are necessary the product should achieve 25 picosiemens/meter or greater at the handling temperature.

STORAGE PRECAUTIONS

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

WORK/HYGIENIC PRACTICES

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

8. EXPOSURE CONTROLS and PERSONAL PROTECTION

EXPOSURE LIMITS

Components (CAS No.)	Source	Exposure Limits TWA/STEL	Note
Diesel Fuel: (68476-34-6)	OSHA	5 mg/m, as mineral oil mist	
	ACGIH	100 mg/m^3 (as totally hydrocarbon vapor) TWA	A3, skin
Naphthalene (91-20-3)	OSHA	10 ppm TWA	
	ACGIH	10 ppm TWA / 15 ppm STEL	A4, Skin

ENGINEERING CONTROLS

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

EYE/FACE PROTECTION

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

SKIN PROTECTION

Gloves constructed of nitrile, neoprene, or PVC are recommended. Chemical protective clothing such as of E.I. DuPont TyChem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

RESPIRATORY PROTECTION
A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

9. PHYSICAL and CHEMICAL PROPERTIES

APPEARANCE
Clear, straw-yellow liquid. Dyed fuel oil will be red or reddish-colored.

ODOR
Mild, petroleum distillate odor

BASIC PHYSICAL PROPERTIES

BOILING RANGE:	320 to 690 oF (160 to 366 °C)
VAPOR PRESSURE:	0.009 psia @ 70 °F (21 °C)
VAPOR DENSITY (air = 1):	> 1.0
SPECIFIC GRAVITY (H_2O = 1):	0.83 to 0.88 @ 60 °F (16 °C)
PERCENT VOLATILES:	100 %
EVAPORATION RATE:	Slow; varies with conditions
SOLUBILITY (H_2O):	Negligible

10. STABILITY and REACTIVITY

STABILITY: Stable. Hazardous polymerization will not occur.

CONDITIONS TO AVOID and INCOMPATIBLE MATERIALS
Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Keep away from strong oxidizers; Viton ®; Fluorel ®

HAZARDOUS DECOMPOSITION PRODUCTS
Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

11. TOXICOLOGICAL PROPERTIES

ACUTE TOXICITY
Acute dermal LD50 (rabbits): > 5 ml/kg
Acute oral LD50 (rats): 9 ml/kg
Primary dermal irritation: extremely irritating (rabbits)
Draize eye irritation: non-irritating (rabbits)
Guinea pig sensitization: negative

CHRONIC EFFECTS AND CARCINOGENICITY
Carcinogenic: OSHA: NO IARC: NO NTP: NO ACGIH: A3

Studies have shown that similar products produce skin tumors in laboratory animals following repeated applications without washing or removal. The significance of this finding to human exposure has not been determined. Other studies with active skin carcinogens have shown that washing the animal's skin with soap and water between applications reduced tumor formation.

MUTAGENICITY (genetic effects)
This material has been positive in a mutagenicity study.

12. ECOLOGICAL INFORMATION

Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

13. DISPOSAL CONSIDERATIONS

Consult federal, state and local waste regulations to determine appropriate disposal options.

14. TRANSPORTATION INFORMATION

PROPER SHIPPING NAME:	Diesel Fuel	Placard (International Only):
HAZARD CLASS and PACKING GROUP:	3, PG III	
DOT IDENTIFICATION NUMBER:	NA 1993 (Domestic) UN 1202 (International)	
DOT SHIPPING LABEL:	None	

Use Combustible Placard if shipping in bulk domestically

15. REGULATORY INFORMATION

U.S. FEDERAL, STATE, and LOCAL REGULATORY INFORMATION

This product and its constituents listed herein are on the EPA TSCA Inventory. Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other regulations at the state and/or local level. Consult those regulations applicable to your facility/operation.

CLEAN WATER ACT (OIL SPILLS)

Any spill or release of this product to "navigable waters" (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIRONMENT)

The CERCLA definition of hazardous substances contains a "petroleum exclusion" clause which exempts crude oil, refined, and unrefined petroleum products and any indigenous components of such. However, other federal reporting requirements (e.g., SARA Section 304 as well as the Clean Water Act if the spill occurs on navigable waters) may still apply.

SARA SECTION 311/312 - HAZARD CLASSES

ACUTE HEALTH	CHRONIC HEALTH	FIRE	SUDDEN RELEASE OF PRESSURE	REACTIVE
X	X	X	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

This product may contain listed chemicals below the *de minimis* levels which therefore are not subject to the supplier notification requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372. If you may be required to report releases of chemicals listed in 40 CFR 372.28, you may contact Hess Corporate Safety if you require additional information regarding this product.

CALIFORNIA PROPOSITON 65 LIST OF CHEMICALS

This product contains the following chemicals that are included on the Proposition 65 "List of Chemicals" required by the California Safe Drinking Water and Toxic Enforcement Act of 1986:

INGREDIENT NAME (CAS NUMBER)	Date Listed
Diesel Engine Exhaust (no CAS Number listed)	10/01/1990

CANADIAN REGULATORY INFORMATION (WHMIS)

Class B, Division 3 (Combustible Liquid) and Class D, Division 2, Subdivision B (Toxic by other means)

16. OTHER INFORMATION

NFPA® HAZARD RATING

HEALTH:	0
FIRE:	2
REACTIVITY:	0

Refer to NFPA 704 "Identification of the Fire Hazards of Materials" for further information

HMIS® HAZARD RATING

HEALTH:	1 *	* Chronic
FIRE:	2	
PHYSICAL:	0	

SUPERSEDES MSDS DATED: 02/28/2001

ABBREVIATIONS:

AP = Approximately < = Less than > = Greater than
N/A = Not Applicable N/D = Not Determined ppm = parts per million

ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute (212) 642-4900
API	American Petroleum Institute (202) 682-8000
CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act
DOT	U.S. Department of Transportation [General info: (800) 467-4922]
EPA	U.S. Environmental Protection Agency
HMIS	Hazardous Materials Information System
IARC	International Agency For Research On Cancer
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association (617)770-3000
NIOSH	National Institute of Occupational Safety and Health
NOIC	Notice of Intended Change (proposed change to ACGIH TLV)
NTP	National Toxicology Program
OPA	Oil Pollution Act of 1990
OSHA	U.S. Occupational Safety & Health Administration
PEL	Permissible Exposure Limit (OSHA)
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limit (NIOSH)
SARA	Superfund Amendments and Reauthorization Act of 1986 Title III
SCBA	Self-Contained Breathing Apparatus
SPCC	Spill Prevention, Control, and Countermeasures
STEL	Short-Term Exposure Limit (generally 15 minutes)
TLV	Threshold Limit Value (ACGIH)
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average (8 hr.)
WEEL	Workplace Environmental Exposure Level (AIHA)
WHMIS	Canadian Workplace Hazardous Materials Information System

MATERIAL SAFETY DATA SHEET

MSDS

FOR ODORIZED PROPANE

Health Administration Hazard Communication Standard published November 23, 1983 (Title 29 CFR Part 1910).

Chemical Manufacturers, Importers, and Distributors must have complied by November 25, 1985. All manufacturing employers covered by the Standard (SIC Codes 20-39) must have complied by May 25, 1986.

The Standard was amended August 24, 1987 (Vol. 52, *Federal Register,* page 31852) to extend its application beyond the manufacturing sector and to include all employers where chemicals are either used, distributed, or are produced for use or distribution, effective May 23, 1988.

Also for complying with the requirements of the Environmental Protection Agency Community Right to Know rules published October 15, 1987 (Vol. 52, *Federal Register,* page 38344) under Title III of the Superfund Amendments and Reauthorization Act of 1986 (Public Law 99-499).

INSTRUCTIONS TO SUPPLIER USING THE MSDS:

- Insert Supplier Name, Address, and Emergency Phone Number in "1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION."
- Insert issue date on last page of MSDS.
- Have copies reproduced for distribution.

MATERIAL SAFETY DATA SHEET
FOR ODORIZED PROPANE

1. Chemical Product and Company Identification

Product Name: Odorized Commercial Propane

Chemical Name: Propane

Chemical Family: Paraffinic Hydrocarbon

Formula: C3H8

Synonyms: Dimethylmethane, LP-Gas, Liquefied Petroleum Gas (LPG), Propane, Propyl Hydride

Name & Address:	Transportation Emergency Number:	Emergency Number: For Routine Info, Call:

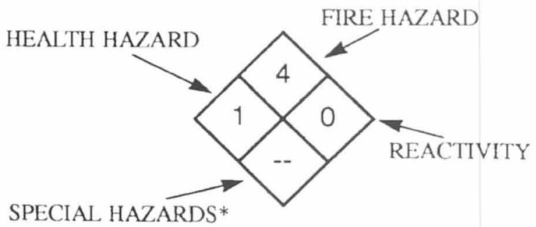
2. Composition/Information on Ingredients

INGREDIENT NAME /CAS NUMBER	PERCENTAGE	OSHA PEL	ACGIH TLV
Propane/74-98-6	87.5-100	1,000 ppm	Simple asphyxiant
Ethane/74-84-0	0-5.0		Simple asphyxiant
Propylene/115-07-1	0-10.0		Simple asphyxiant
Butanes/various	0-2.5		Simple asphyxiant
Ethyl Mercaptan/75-08-1	16-25 ppm	0.5 ppm	0.5 ppm

3. Hazards Identification

EMERGENCY OVERVIEW

DANGER! Flammable liquefied gas under pressure. Keep away from heat, sparks, flame, and all other ignition sources. Vapor replaces oxygen available for breathing and may cause suffocation in confined spaces. Use only with adequate ventilation. Odor may not provide adequate warning of potentially hazardous concentrations. Vapor is heavier than air. Liquid can cause freeze burn similar to frostbite. Do not get liquid in eyes, on skin, or on clothing. Avoid breathing of vapor. Keep container valve closed when not in use.



Severe 4 — Slight 1

Serious 3 — Minimal 0

Moderate 2 — * (Ref. NFPA 704)

POTENTIAL HEALTH EFFECTS INFORMATION

ROUTES OF EXPOSURE:

Inhalation: Asphyxiant. It should be noted that before suffocation could occur, the lower flammability limit of propane in air would be exceeded, possibly causing both an oxygen-deficient and explosive atmosphere. Exposure to concentrations >10% may cause dizziness. Exposure to atmospheres containing 8%-10% or less oxygen will bring about unconsciousness without warning, and so quickly that the individuals cannot help or protect themselves. Lack of sufficient oxygen may cause serious injury or death.

Eye Contact: Contact with liquid can cause freezing of tissue.

Skin Contact: Contact with liquid can cause frostbite.

[**Skin Absorption**]: None.

[**Ingestion**]: Liquid can cause freeze burn similar to frostbite. Ingestion not expected to occur in normal use.

CHRONIC EFFECTS: None.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None.

OTHER EFFECTS OF OVEREXPOSURE: None.

CARCINOGENICITY: Propane is not listed by NTP, OSHA or IARC.

4. First Aid Measures

INHALATION: Persons suffering from lack of oxygen should be removed to fresh air. If victim is not breathing, administer artificial respiration. If breathing is difficult, administer oxygen. Obtain prompt medical attention.

EYE CONTACT: Contact with liquid can cause freezing of tissue. Gently flush eyes with lukewarm water. Obtain medical attention immediately.

SKIN CONTACT: Contact with liquid can cause frostbite. Remove saturated clothes, shoes and jewelry. Immerse affected area in lukewarm water not exceeding 105° F. Keep immersed. Get prompt medical attention.

INGESTION: If swallowed, get immediate medical attention.

NOTES TO PHYSICIAN: None.

5. Fire-fighting Measures

FLASH POINT: -156° F (-104° C) **AUTOIGNITION:** 842° F (432° C)

IGNITION TEMPERATURE IN AIR: 920-1120° F

FLAMMABLE LIMITS IN AIR BY VOLUME: Lower: 2.15% Upper: 9.6%

EXTINGUISHING MEDIA: Dry chemical, CO^2, water spray or fog for surrounding area. Do not extinguish fire until propane source is shut off.

SPECIAL FIRE-FIGHTING INSTRUCTIONS: Evacuate personnel from danger area. Immediately cool container with water spray from maximum distance, taking care not to extinguish flames. If flames are accidentally extinguished, explosive re-ignition may occur. Where water is abundant and immediate, the fire should be allowed to burn while the container and area are cooled and the flow of propane is shut off. Where water is scarce, compare the risk of allowing the area to continue to heat from the fire and the alternative of extinguishing the fire without shutting off the propane flow, which may allow for the propane to accumulate and re-ignite explosively.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Propane is easily ignited. It is heavier than air; therefore, it can collect in low areas where an ignition source can be present. Pressure in a container can build up due to heat and container may rupture if pressure relief devices should fail to function. Propane released from a properly functioning relief valve on an overheated container can also become ignited.

HAZARDOUS COMBUSTION PRODUCTS: None.

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: Evacuate the immediate area. Eliminate any possible sources of ignition and provide maximum ventilation. Shut off source of propane, if possible. If leaking from container, or valve, contact your supplier.

7. Handling and Storage

HANDLING PRECAUTIONS: Propane vapor is heavier than air and can collect in low areas that are without sufficient ventilation. Leak-check system with a leak detector or solution, never with flame. Make certain the container service valve is shut off prior to connecting or disconnecting. If container valve does not operate properly, discontinue use and contact supplier. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into pressure relief valve or cylinder valve cap openings. Do not drop or abuse cylinders. Never strike an arc on a gas container or make a container part of an electrical circuit. See "16. OTHER INFORMATION" for additional precautions.

STORAGE PRECAUTIONS: Store in a safe, authorized location (outside, detached storage is preferred) with adequate ventilation. Specific requirements are listed in NFPA 58, *Standard for the Storage and Handling of Liquefied Petroleum Gases.* Isolate from heat and ignition sources. Containers should never be allowed to reach temperature exceeding 125° F (52° C). Isolate from combustible materials. Provide separate storage locations for other compressed and flammable gases. Propane containers should be separated from oxygen cylinders, or other oxidizers, by a minimum distance of 20 feet, or by a barrier of non-combustible material at least 5 feet high having a fire rating of at least 1/2 hour. Full and empty cylinders should be segregated. Store cylinders in upright position, or with pressure relief valve in vapor space. Do not drop or abuse cylinders. Keep container valve closed and plugged or capped when not in use. Install protective caps when cylinders are not connected for use. Empty containers retain some residue and should be treated as if they were full.

8. Exposure Controls/Personal Protection

ENGINEERING CONTROLS

Ventilation: Provide ventilation adequate to ensure propane does not reach a flammable mixture.

RESPIRATORY PROTECTION (SPECIFY TYPE)

General Use: None.

Emergency Use: If concentrations are high enough to warrant supplied-air or self-contained breathing apparatus, then the atmosphere may be flammable (See Section 5). Appropriate precautions must be taken regarding flammability.

PROTECTIVE CLOTHING: Avoid skin contact with liquid propane because of possibility of freeze burn. Wear gloves and protective clothing which are impervious to the product for the duration of the anticipated exposure.

EYE PROTECTION: Safety glasses are recommended when handling cylinders.

OTHER PROTECTIVE EQUIPMENT: Safety shoes are recommended when handling cylinders.

9. Physical and Chemical Properties

BOILING POINT: @ 14.7 psia = -44° F

SPECIFIC GRAVITY OF VAPOR (Air = 1) at 60° F: 1.50

SPECIFIC GRAVITY OF LIQUID (Water = 1) at 60° F: 0.504

VAPOR PRESSURE: @ 70° F = 127 psig

@ 105° F = 210 psig

EXPANSION RATIO (From liquid to gas @ 14.7 psia): 1 to 270

SOLUBILITY IN WATER: Slight, 0.1 to 1.0%

APPEARANCE AND ODOR: A colorless and tasteless gas at normal temperature and pressure. An odorant (ethyl mercaptan) has been added to provide a strong unpleasant odor. Should a propane-air mixture reach the lower limits of flammability, the ethyl mercaptan concentration will be approximately 0.5 ppm in air.

ODORANT WARNING: Odorant is added to aid in the detection of leaks. One common odorant is ethyl mercaptan, CAS No. 75-08-01. Odorant has a foul smell. The ability of people to detect odors varies widely. Also, certain chemical reactions with material in the propane system, or fugitive propane gas from underground leaks passing through certain soils, can reduce the odor level. No odorant will be 100% effective in all circumstances. If odorant appears to be weak, notify propane supplier immediately.

10. Stability and Reactivity

STABILITY: Stable.

Conditions to Avoid: Keep away from high heat, strong oxidizing agents and sources of ignition.

REACTIVITY:

Hazardous Decomposition Products: Under fire conditions, fumes, smoke, carbon monoxide, aldehydes and other decomposition products. When used as an engine fuel, incomplete combustion can cause carbon monoxide, a toxic gas.

Hazardous polymerization: Will not occur.

11. Toxicological Information

Propane is non-toxic and is a simple asphyxiant, however, it does have slight anesthetic properties and higher concentrations may cause dizziness.

[IRRITANCY OF MATERIAL]: None.

[SENSITIZATION TO MATERIAL]: None

[REPRODUCTIVE EFFECTS]: None

[TERATOGENICITY]: None

[MUTAGENICITY]: None

[SYNERGISTIC MATERIALS]: None

12. Ecological Information

No adverse ecological effects are expected. Propane does not contain any Class I or Class II ozone-depleting chemicals (40 CFR Part 82). Propane is not listed as a marine pollutant by DOT (49 CFR Part 171).

13. Disposal Considerations

WASTE DISPOSAL METHOD: Do not attempt to dispose of residual or unused product in the container. Return to supplier for safe disposal.

Residual product within process system may be burned at a controlled rate, if a suitable burning unit (flare stack) is available on site. This shall be done in accordance with federal, state and local regulations.

14. Transport Information

DOT SHIPPING NAME: Liquefied Petroleum Gas

IDENTIFICATION NUMBER: UN 1075

IMO SHIPPING NAME: Propane

IMO IDENTIFICATION NUMBER: UN 1978

HAZARD CLASS: 2.1 (Flammable Gas)

PRODUCT RQ: None **SHIPPING LABEL(S):** Flammable gas

PLACARD (WHEN REQUIRED): Flammable gas

SPECIAL SHIPPING INFORMATION: Container should be transported in a secure, upright position in a well-ventilated vehicle.

15. Regulatory Information

The following information concerns selected regulatory requirements potentially applicable to this product. Not all such requirements are identified. Users of this product are responsible for their own regulatory compliance on a federal, state [provincial] and local level.

U.S. FEDERAL REGULATIONS

EPA Environmental Protection Agency

CERCLA Comprehensive Environmental Response, Compensation and Liability Act of 1980 (40 CFR Parts 117 and 302)

Reportable Quantity (RQ): None

SARA Superfund Amendment and Reauthorization Act

- SECTION 302/304: Requires emergency planning on threshold planning quantities (TPQ) and release reporting based on reportable quantities (RQ) of EPA's extremely hazardous substances (40 CFR Part 355).

  Extremely Hazardous Substances: None

  Threshold Planning Quantity (TPQ): None

- SECTIONS 311/312: Require submission of material safety data sheets (MSDSs) and chemical inventory reporting with identification of EPA-defined hazard classes (40 CFR Part 370). The hazard classes for this product are:

  IMMEDIATE: No PRESSURE: Yes

  DELAYED: No REACTIVITY: No FLAMMABLE: Yes

- SECTION 313: Requires submission of annual reports of release of toxic chemicals that appear in 40 CFR Part 372.

  Propane does not require reporting under Section 313.

40 CFR PART 68 Risk Management for Chemical Accidental Release

TSCA Toxic Substance Control Act

Propane is listed on the TSCA inventory.

OSHA Occupational Safety and Health Administration

29 CFR 1910.119: Process Safety Management of Highly Hazardous Chemicals.

FDA Food and Drug Administration

21 CFR 184.1655: Generally recognized as safe (GRAS) as a direct human food ingredient when used as a propellant, aerating agent and gas.

16. Other Information

SPECIAL PRECAUTIONS: Use piping and equipment adequately designed to withstand pressure to be encountered.

NFPA 58 *Standard for the Storage and Handling of Liquefied Petroleum Gases* and OSHA 29 CFR 1910.10 require that all persons employed in handling LP-gases be trained in proper handling and operating procedures, which the employer shall document. Contact your propane supplier to arrange for the required training. Allow only trained and qualified persons to install and service propane containers and systems.

WARNING: Be aware that with odorized propane the intensity of ethyl mercaptan stench (its odor) may fade due to chemical oxidation (in the presence of rust, air or moisture), adsorption or absorption. Some people have nasal perception problems and may not be able to smell the ethyl mercaptan stench. Leaking propane from underground gas lines may lose its odor as it passes through certain soils. While ethyl mercaptan may not impart the warning of the presence of propane in every instance, it is generally effective in a majority of situations. Familiarize yourself, your employees and customers with this warning, and other facts associated with the so-called "odor-fade" phenomenon. If you do not already know all the facts, contact your propane supplier for more information about odor, electronic gas alarms and other safety considerations associated with the handling, storage and use of propane.

ISSUE INFORMATION

Issue Date:_____

This material safety data sheet and the information it contains is offered to you in good faith as accurate. This Supplier does not manufacture this product but is a supplier of the product independently manufactured by others. Much of the information contained in this data sheet was received from sources outside our Company. To the best of our knowledge this information is accurate, but this Supplier does not guarantee its accuracy or completeness. Health and safety precautions in this data sheet may not be adequate for all individuals and/or situations. It is the user's obligation to evaluate and use this product safely, comply with all applicable laws and regulations and to assume the risks involved in the use of this product.

NO WARRANTY OR MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSES, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OF COMPLETENESS OF THIS INFORMATION, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE.

Prepared by

NATIONAL PROPANE GAS ASSOCIATION

1600 Eisenhower Lane, Suite 100, Lisle, Illinois 60532

Phone 630/515-0600

Printed in U.S.A.

The purpose of this bulletin is to set forth general safety practices for the installation, operation, and maintenance of LP-gas equipment. It is not intended to be an exhaustive treatment of the subject, and should not be interpreted as precluding other procedures which would enhance safe LP-gas operations. Issuance of this bulletin is not intended to nor should it be construed as an undertaking to perform services on behalf of any party either for their protection or for the protection of third parties. The National Propane Gas Association assumes no liability for reliance on the contents of this bulletin.

Issued 12/96

APPENDIX B

TANK UNLOADING PROTOCOL

4.4 Mini-bulk Unloading

1) Comply with all customer safety and entry procedures.
2) The following PPE is required for mini-bulk unloading at customer sites in addition to any PPE that the customer requires:
   - For corrosive products; chemical splash resistant coveralls or jacket and bibbed pants, goggles, helmet with face shield, chemical resistant gloves, and appropriate footwear shall be worn. **Note**: Face shield and goggles may be lifted or removed and kept close at hand if employee is away from possible splash exposure (minimum 10 feet).
   - For non-corrosive products; hard hat w/face shield, safety goggles, appropriate gloves, and coveralls or lab coat shall be worn.
   - If an employee has any question regarding the proper PPE to wear for a particular task, they should contact either their supervisor or safety manager or review the PPE policy in the Safety Manual.
3) Park truck as close to delivery point as possible. Truck must be in neutral with the brakes set before unloading may begin.
4) Check to see if there are any storm drains that could become a concern in the event of a spill. If so, be prepared to secure storm drains if needed.
5) Secure area around truck from unnecessary pedestrian traffic with warning barricades/cones.
6) Identify tank to be filled, verify product, UN number, and product label. Verify product level in tank. In the event that the driver cannot determine that there is sufficient room in the tank to safely unload or verify the product in the tank, the driver will notify dispatch that he is unable to deliver the product and will be authorized to not deliver the product. Notify customer if rainwater removal from containment is necessary. Do not fill a tank that is floating.
7) If tank is not properly labeled, the delivery will not take place. Steps should be taken to get customer to label their tank before cancelling the delivery. Notify Dispatch of unmarked tanks. Complete Delivery Problem Report if necessary.
8) **KNOW THE LOCATION OF THE NEAREST EYEWASH AND SAFETY SHOWER AND THAT THEY ARE OPERATIONAL. ACTIVATING THE SAFETY SHOWER AND EYEWASH ASSURES YOU THAT THEY ARE FUNCTIONING PROPERLY. DON'T TAKE IT FOR GRANTED THE WATER IS ON.** Check with customer prior to activating the safety shower and eyewash, as they may be alarmed. Notify Customer and Dispatch if shower/eyewash is either not available or not working. If Safety Shower or Eyewash is not operating, locate alternative means for safety water. If no alternative exists, delivery will not take place. Complete Delivery Problem Report if necessary.
9) Locate and inspect Vent Trap for HCl and Nitric Acid tanks. Ensure that Vent Trap has proper solution level, an operational vacuum breaker, and is ready for use. **Note**: The frequency of this test is dependent on the size of the tank and quantities/frequency deliveries are being received.
10) Identify tank and hose to be used to fill customer tank and reconfirm product matches labeling on customer tank.

11) As a quick check, the nozzle for Hydrochloric Acid, dilute Sulfuric Acid, and Sodium Hypochlorite is made of PVC, while all others for the major product lines are made of stainless steel. **Note**: Sodium Hypochlorite uses 1 ½" female cam-lock on trailer as a visual check for product identity.

12) Pull enough hose off the trailer to reach the tank and to **avoid kinking.**

13) Carefully route hose from the trailer to the customer tank and assure routing will not endanger any people, processes, or be subject to damage via forklift or other machinery. Get customer assistance if needed.

14) Pull hose valve and nozzle to the tank and connect the delivery hose to the load line, ensuring that the camlock ears are secured (self locking, Velcro strap, or wire tied). If there is no positive connection, use tank's bulkhead fitting with delivery hose fill nozzle. Write a Delivery Problem Report indicating that there is no positive connection so the tank can be upgraded.

15) Note the beginning tank level and open trailer compartment vent and internal valve.

16) Increase tractor motor speed to a maximum of 1400 to 1500 rpm.

17) Slowly open the delivery hose valve, the trailer air valve and product pump air valve to begin pumping liquid to the tank. **Note**: Air Diaphragm Pump is to be operated at the minimum pressure needed to make the delivery.

18) Verify that the delivery hose to load line connection is secure while product is being pumped.

19) Check diaphragm pump, hose, and tank for any leaks.

20) When filling through a load line, use caution when hooking up in case product is in line. Also watch load lines during pumping to avoid excessive vibration or strain.

21) While pumping, keep other people away from tank and trailer.

22) Watch for forklift trucks, vehicles of any kind, or any ongoing actions, which may threaten the integrity of your equipment or the safety of the filling operation.

23) In order to respond to a spill or leak, and to perform the duties associated with unloading, the driver must remain in the immediate unloading area and **may not be in the cab during pumping**.

24) When filling a tank, visually check for any leaks or dangerous situations, which may hinder tank integrity. For HCl and Nitric Acid deliveries, check to ensure vent trap is operating properly, venting and neutralizing vapors and not over pressurizing product tank.

25) If vent trap does not appear to be functioning properly or if tank is building up pressure, first slow the pump and check vent trap and tank again. If pressure continues to build up or vent trap still does not appear to be functioning properly, stop pumping and close discharge valve. **Notify Dispatch and Customer of problem.**

26) When the tank is near capacity leave enough room to purge your delivery hose without overfilling the tank. The maximum fill on minibulk tanks is 90%. Close the tank compartment discharge valve and vent.

27) Remove the purge valve cap on the pump intake and attach vacuum breaker, if not permanently installed. Slightly open the purge valve to displace remaining product in the hose. Operate the pump at a moderate speed as to have enough suction not to allow product to come back through the purge valve, and enough to properly clear the discharge hose.

28) When the hose is empty, close the purge valve, and the pump air supply valve.

29) Close the delivery hose valve, cap fill nozzle, plug customer tank fitting (if applicable), and return hose to trailer.

30) Get receipt signed and make any unsafe situations you observed or encountered during the delivery known to the customer. Complete Delivery Problem Report if necessary.

31) In the event of a spill, follow the initial steps listed below in addition to the procedure trained on and found in the Emergency Response Manual, Customer Site Emergencies:

- **IMMEDIATELY STOP PUMPING**.
- Close all air valves.
- Close all discharge valves and compartment vents.
- Use spill kit on the truck to control and/or completely mop up the spill.
- Notify the customer of the spill even if you have cleaned it. Assist customer if he wants to wash or pick up spill himself.
- Report all spills to the Dispatch immediately. After cleanup is complete, take pictures with glove box camera. Complete a written report of the incident.
- Get the names of people you had contact with concerning the spill. Make a note on the delivery tag summarizing the satisfactory clean-up and have a customer supervisor sign it before you leave.
- If you get a chemical burn or are otherwise injured at a customer site, shut down pumping immediately or be sure that someone else does as soon as possible if you are unable. Get immediate assistance and first aid. Inform Dispatch as soon as possible.

APPENDIX C

OSHA FACT SHEET ON EXCAVATION

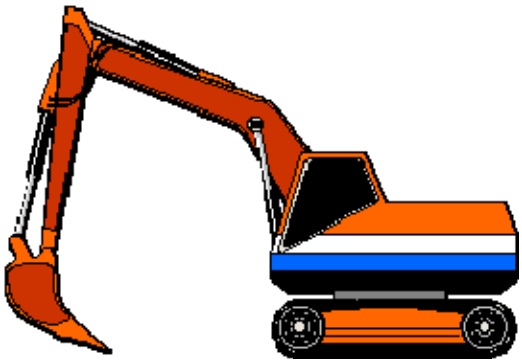
Construction Safety and Health Outreach Program

U.S. Department of Labor
OSHA Office of Training and Education
May 1996

INTRODUCTION

The Occupational Safety and Health Administration (OSHA) issued its first Excavation and Trenching Standard in 1971 to protect workers from excavation hazards. Since then, OSHA has amended the standard several times to increase worker protection and to reduce the frequency and severity of excavation accidents and injuries. Despite these efforts, excavation-related accidents resulting in injuries and fatalities continue to occur.

To better assist excavation firms and contractors, OSHA completely updated the existing standard to simplify many of the existing provisions, add and clarify definitions, eliminate duplicate provisions and ambiguous language, and give employers added flexibility in providing protection for employees. The standard was effective as of March 5, 1990.



In addition, the standard provides several new appendices. One appendix provides a consistent method of soil classification. Others provide sloping and benching requirements, pictorial examples of shoring and shielding devices, timber tables, hydraulic shoring tables, and selection charts that provide a graphic summary of the requirements contained in the standard.

This discussion highlights the requirements in the updated standard for excavation and trenching operations, provides methods for protecting employees against cave-ins, and describes safe work practices for employees.

SCOPE AND APPLICATION

OSHA's revised rule applies to all open excavations made in the earth's surface, which includes trenches.

According to the OSHA construction safety and health standards, a *trench* is referred to as a narrow excavation made below the surface of the ground in which the depth is greater than the width-the width not exceeding 15 feet. An *excavation* is any man-made cut, cavity, trench, or depression in the earth's surface formed by earth removal. This can include excavations for anything from cellars to highways.

GENERAL REQUIREMENTS

Planning for Safety

Many on-the-job accidents are a direct result of inadequate initial planning. Correcting mistakes in shoring and/or sloping after work has begun slows down the operation, adds to the cost, and increases the possibility of an excavation failure. The contractor should build safety into the pre-bid planning in the same way all other pre-bid factors are considered.

It is a good idea for contractors to develop safety checklists before preparing a bid, to make certain there is adequate information about the job site and all needed items are on hand.

These checklists should incorporate elements of the relevant OSHA standards as well as other information necessary for safe operations.

Before preparing a bid, these specific site conditions should be taken into account:

- Traffic,
- Nearness of structures and their conditions,

- Soil,
- Surface and ground water,
- The water table,
- Overhead and underground utilities, and
- Weather.

These and other conditions can be determined by job site studies, observations, test borings for soil type or conditions, and consultations with local officials and utility companies.

Before any excavation actually begins, the standard requires the employer to determine the estimated location of utility installations-sewer, telephone, fuel, electric, water lines, or any other underground installations—that may be encountered during digging. Also, before starting the excavation, the contractor must contact the utility companies or owners involved and inform them, within established or customary local response times, of the proposed work. The contractor must also ask the utility companies or owners to find the exact location of the underground installations. If they cannot respond within 24 hours (unless the period required by state or local law is longer), or if they cannot find the exact location of the utility installations, the contractor may proceed with caution. To find the exact location of underground installations, workers must use safe and acceptable means. If underground installations are exposed, OSHA regulations also require that they be removed, protected or properly supported.

When all the necessary specific information about the job site is assembled, the contractor is ready to determine the amount, kind, and cost of the safety equipment needed. A careful inventory of the safety items on hand should be made before deciding what additional safety material must be acquired. No matter how many trenching, shoring and backfilling jobs have been done in the past, each job should be approached with the utmost care and preparation.

Before Beginning the Job

It is important, before beginning the job, for the contractor to establish and maintain a safety and health program for the work site that provides adequate systematic policies, procedures, and practices to protect employees from, and allow them to recognize, job-related safety and health hazards.

An effective program includes provisions for the systematic identification, evaluation, and prevention or control of general workplace hazards, specific job hazards, and potential hazards that may arise from foreseeable conditions. The program may be written or verbal but it should reflect the unique characteristics of the job site.

To help contractors develop an effective safety and health program, in 1989, OSHA issued recommended guidelines for the effective management and protection of worker safety and health. The complete original text of the nonmandatory guidelines is found in the *Federal Register* [54 FR (18):3904-3916, January 26, 1989].

A copy of the guidelines can be obtained from the OSHA Publications Office, U.S. Department of Labor, 200 Constitution Avenue, N.W., Room N-3101, Washington, D.C. 20210, or from the nearest OSHA Regional Office.

To be sure safety policies are implemented effectively, there must be cooperation among supervisors, employee groups, including unions, and individual employees. Each supervisor must understand the degree of responsibility and authority he or she holds in a particular area. For effective labor support, affected unions should be notified of construction plans and asked to cooperate.

It is also important, before beginning work, for employers to provide employees who are exposed to public vehicular traffic with warning vests or other suitable garments marked with or made of reflectorized or high-visibility material and ensure that they wear them. Workers must also be instructed to remove or neutralize surface encumbrances that may create a hazard.

In addition, no employee should operate a piece of equipment without first being properly trained to handle it and fully alerted to its potential hazards.

In the training and in the site safety and health program, it also is important to incorporate procedures for fast notification and investigation of accidents.

On-the-Job Evaluation

The standard requires that a competent person inspect, on a daily basis, excavations and the adjacent areas for possible cave-ins, failures of protective systems and equipment, hazardous atmospheres, or other hazardous conditions. If these conditions are encountered, exposed employees must be removed from the hazardous area until the necessary safety precautions have been taken. Inspections are also required after natural (e.g., heavy rains) or man-made events such as blasting that may increase the potential for hazards.

Larger and more complex operations should have a full-time safety official who makes recommendations to improve the implementation of the safety plan. In a smaller operation, the safety official may be part-time and usually will be a supervisor.

Supervisors are the contractor's representatives on the job. Supervisors should conduct inspections, investigate accidents, and anticipate hazards. They should ensure that employees receive on-the-job safety and health training. They should also review and strengthen overall safety and health precautions to guard against potential hazards, get the necessary worker cooperation in safety matters, and make frequent reports to the contractor.

It is important that managers and supervisors set the example for safety at the job site. It is essential that when visiting the job site, all managers, regardless of status, wear the prescribed personal protective equipment such as safety shoes, safety glasses, hard hats, and other necessary gear (see CFR 1926.100 and 102).

Employees must also take an active role in job safety. The contractor and supervisor should make certain that workers have been properly trained in the use and fit of the prescribed protective gear and equipment, that they are wearing and using the equipment correctly, and that they are using safe work practices.

Cave-Ins and Protective Support Systems

Support Systems

Excavation workers are exposed to many hazards, but the chief hazard is danger of cave-ins. OSHA requires that in all excavations employees exposed to potential cave-ins must be protected by sloping, or benching the sides of the excavation; supporting the sides of the excavation, or placing a shield between the side of the excavation and the work area.

Designing a protective system can be complex because of the number of factors involved-soil classification, depth of cut, water content of soil, changes due to weather and climate, or other operations in the vicinity. The standard, however, provides several different methods and approaches (four for sloping and four for shoring, including the use of shields)[(1)] for designing protective systems that can be used to provide the required level of protection against cave-ins.

One method of ensuring the safety and health of workers in an excavation is to slope the sides to an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal). These slopes must be excavated to form configurations that are in accordance with those for Type C soil found in Appendix B of the standard. A slope of this gradation or less is considered safe for any type of soil (see Figure 1).

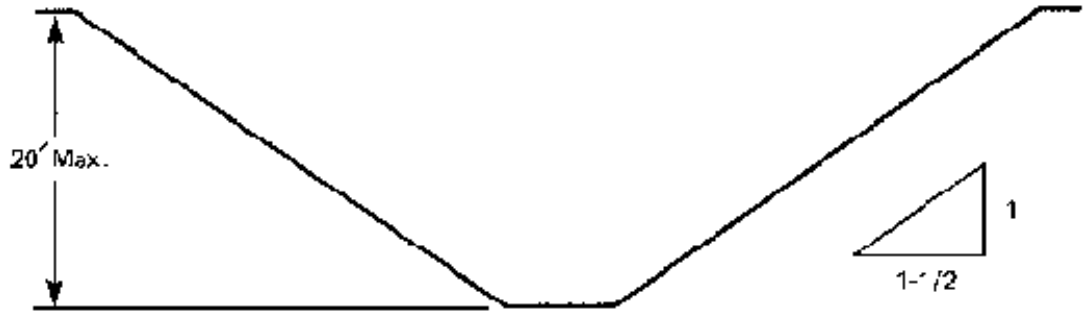


Figure 1. Excavations Made in Type C Soil
All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1 1/2:1.

A second design method, which can be applied for both sloping and shoring, involves using tabulated data, such as tables and charts, approved by a registered professional engineer. These data must be in writing and must include sufficient explanatory information to enable the user to make a selection, including the criteria for determining the selection and the limits on the use of the data.

At least one copy of the information, including the identity of the registered professional engineer who approved the data, must be kept at the worksite during construction of the protective system. Upon completion of the system, the data may be stored away from the job site, but a copy must be made available, upon request, to the Assistant Secretary of Labor for OSHA.

Contractors also may use a trench box or shield that is either designed or approved by a registered professional engineer or is based on tabulated data prepared or approved by a registered professional engineer. Timber, aluminum, or other suitable materials may also be used. OSHA standards permit the use of a trench shield (also known as a welder's hut) as long as the protection it provides is equal to or greater than the protection that would be provided by the appropriate shoring system (see Figure 2).

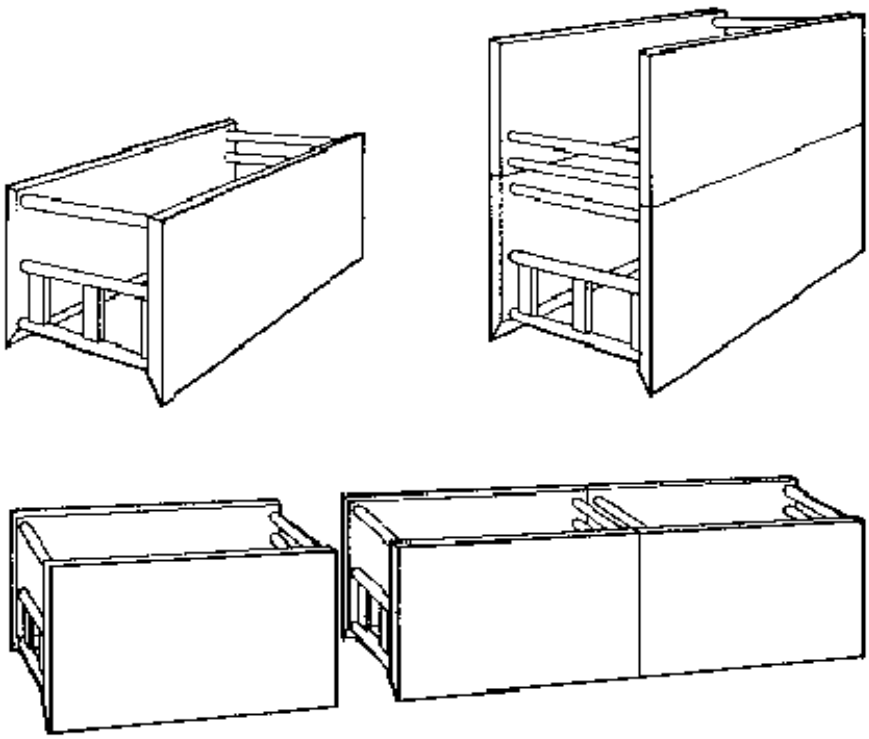


Figure 2. Trench Shields

The employer is free to choose the most practical design approach for any particular circumstance. Once an approach has been selected, however, the required performance criteria must be met by that system.

The standard does not require the installation and use of a protective system when an excavation (1) is made entirely in stable rock, or (2) is less than 5 feet deep and a competent person has examined the ground and found no indication of a potential cave-in.

Safety Precautions

The standard requires the employer to provide support systems such as shoring, bracing, or underpinning to ensure the stability of adjacent structures such as buildings, walls, sidewalks or pavements.

The standard prohibits excavation below the level of the base or footing of any foundation or retaining wall unless (1) a support system such as underpinning is provided, (2) the excavation is in stable rock, or (3) a registered professional engineer determines that the structure is sufficiently removed from the excavation and that excavation will not pose a hazard to employees.

Excavations under sidewalks and pavements are also prohibited unless an appropriately designed support system is provided or another effective method is used.

Installation and Removal of Protective Systems

The standard requires the following procedures for the protection of employees when installing support systems:

- Securely connect members of support systems,
- Safely install support systems,
- Never overload members of support systems, and
- Install other structural members to carry loads imposed on the support system when temporary removal of individual members is necessary.

In addition, the standard permits excavation of 2 feet or less below the bottom of the members of a support or shield system of a trench if (1) the system is designed to resist the forces calculated for the full depth of the trench, and (2) there are no indications, while the trench is open, of a possible cave-in below the bottom of the support system. Also, the installation of support systems must be closely coordinated with the excavation of trenches.

As soon as work is completed, the excavation should be back-filled as the protective system is dismantled. After the excavation has been cleared, workers should slowly remove the protective system from the bottom up, taking care to release members slowly.

Materials and Equipment

The employer is responsible for the safe condition of materials and equipment used for protective systems. Defective and damaged materials and equipment can result in the failure of a protective system and cause excavation hazards.

To avoid possible failure of a protective system, the employer must ensure that (1) materials and equipment are free from damage or defects, (2) manufactured materials and equipment are used and maintained in a manner consistent with the recommendations of the manufacturer and in a way that will prevent employee exposure to hazards, and (3) while in operation, damaged materials and equipment are examined by a competent person to determine if they are suitable for continued use. If materials and equipment are not safe for use, they must be removed from service. These materials cannot be returned to service without the

evaluation and approval of a registered professional engineer.

Other Hazards

Falls and Equipment

In addition to cave-in hazards and secondary hazards related to cave-ins, there are other hazards from which workers must be protected during excavation-related work. These hazards include exposure to falls, falling loads, and mobile equipment. To protect employees from these hazards, OSHA requires the employer to take the following precautions:

- Keep materials or equipment that might fall or roll into an excavation at least 2 feet from the edge of excavations, or have retaining devices, or both.
- Provide warning systems such as mobile equipment, barricades, hand or mechanical signals, or stop logs, to alert operators of the edge of an excavation. If possible, keep the grade away from the excavation.
- Provide scaling to remove loose rock or soil or install protective barricades and other equivalent protection to protect employees against falling rock, soil, or materials.
- Prohibit employees from working on faces of sloped or benched excavations at levels above other employees unless employees at lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.
- Prohibit employees under loads that are handled by lifting or digging equipment. To avoid being struck by any spillage or falling materials, require employees to stand away from vehicles being loaded or unloaded. If cabs of vehicles provide adequate protection from falling loads during loading and unloading operations, the operators may remain in them.

Water Accumulation

The standard prohibits employees from working in excavations where water has accumulated or is accumulating unless adequate protection has been taken. If water removal equipment is used to control or prevent water from accumulating, the equipment and operations of the equipment must be monitored by a competent person to ensure proper use.

OSHA standards also require that diversion ditches, dikes, or other suitable means be used to prevent surface water from entering an excavation and to provide adequate drainage of the area adjacent to the excavation. Also, a competent person must inspect excavations subject to runoffs from heavy rains.

Hazardous Atmospheres

Under this provision, a competent person must test excavations greater than 4 feet in depth as well as ones where oxygen deficiency or a hazardous atmosphere exists or could reasonably be expected to exist, before an employee enters the excavation. If hazardous conditions exist, controls such as proper respiratory protection or ventilation must be provided. Also, controls used to reduce atmospheric contaminants to acceptable levels must be tested regularly.

Where adverse atmospheric conditions may exist or develop in an excavation, the employer also must provide and ensure that emergency rescue equipment, (e.g., breathing apparatus, a safety harness and line, basket stretcher, etc.) is readily available. This equipment must be attended when used.

When an employee enters bell-bottom pier holes and similar deep and confined footing excavations, the employee must wear a harness with a lifeline. The lifeline must be securely attached to the harness and must be separate from any line used to handle materials. Also, while the employee wearing the lifeline is in the excavation, an observer must be present to ensure that the lifeline is working properly and to maintain communication with the employee.

Access and Egress

Under the standard, the employer must provide safe access and egress to all excavations. According to OSHA regulations, when employees are required to be in trench excavations 4-feet deep or more, adequate means of exit, such as ladders, steps, ramps or other safe means of egress, must be provided and be within 25 feet of lateral travel. If structural ramps are

used as a means of access or egress, they must be designed by a competent person if used for employee access or egress, or a competent person qualified in structural design if used by vehicles. Also, structural members used for ramps or runways must be uniform in thickness and joined in a manner to prevent tripping or displacement.

SUMMARY

Trenching and excavation work presents serious risks to all workers involved. The greatest risk, and one of primary concern, is that of a cave-in. Furthermore, when cave-in accidents occur, they are much more likely to result in worker fatalities than other excavation-related accidents. Strict compliance, however, with all sections of the standard will prevent or greatly reduce the risk of cave-ins as well as other excavation-related accidents.

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1. [1] See Appendix F to the standard for a complete overview of all options.

APPENDIX D

INCIDENT REPORT FORM

Date/ Time of Incident:	**INCIDENT REPORT FORM** **SMC** **REMEDIATION PROJECT**	**Project Manger use only:** **Incident No.:** **Incident Type:**
NAME: (First, Middle Initial, Last)		**Employee ID No:**
GIVE EXACT LOCATION OF ACCIDENT OR ILLNESS (Bldg, interior exterior location, well ID):		
DESCRIBE IN DETAIL HOW THE INJURY, ILLNESS, INCIDENT, or RELEASE OCCURRED. (Use additional sheets if necessary):		
If OHM was released: **Source:** **Gallons/ Pounds Released:** **Is the Source Controlled?** **Is the Spill Cleaned Up?**		
If OHM was released, was it a Reportable Quantity? **If yes, list those agencies contacted, contact person, date and time:**		
DESCRIBE IN DETAIL THE RESPONSE ACTION TAKEN (Use additional sheets if necessary):		
NAME(S) OF WITNESSES:		

DESCRIBE INJURY/ILLNESS AND INDICATE SPECIFIC BODY PART(S) AFFECTED:	
EMERGENCY RESPONDERS CONTACTED:	**Date and Time On-Site**
ADDITIONAL INFORMATION:	
SIGNATURE OF EMPLOYEE OR PERSON COMPLETING INCIDENT REPORT: _____	**DATE SIGNED:** / /

EMERGENCY COORDINATOR OR PROJECT MANAGER TO COMPLETE BELOW	
WHERE WAS THE PERSON SENT FOR MEDICAL TREATMENT?	
PERSON'S REGULAR OCCUPATION:	**DATE EMPLOYED:**
DID PERSON LOSE TIME ☐ **YES** ☐ **NO** If yes, date of return to work if known:	**IS FURTHER MEDICAL TREATMENT REQUIRED?** ☐ **YES** ☐ **NO** ☐ **UNKNOWN**
BASED ON YOUR INVESTIGATION, WHAT WAS THE CAUSE(S) OF THIS ACCIDENT/ILLNESS/ INCIDENT/ RELEASE?	
RESPONSE ACTION TO BE COMPLETED TO PREVENT/ MINIMIZE RISK OF REOCCURANCE?	
Print Name: _____ **Sign Name:** _____	

APPENDIX E

DUST/FUGITIVE EMISSIONS ANALYSIS

DUST EXPOSURE CALCULATION WORKSHEET

Example — Safety Factor for this site = 1

Chemical	Exposure Limit (mg/m3)	Maximum Soil Concentration (mg/kg)	Exposure Limit Based on Single Compound (EL Mix, mg/m3)	Dust Quotient for Each Compound (level/limit)	Problem from Single Compound [5mg/m3)/ELmix]
Aluminum	5	1.E-9	5.E+15	2.00E-10	0.000
Antimony	0.5	1.E-9	5.E+14	2.00E-09	0.000
Arsenic	0.01	1.E-9	1.E+13	1.00E-07	0.000
Barium	0.5	1.E-9	5.E+14	2.00E-09	0.000
Beryllium	0.002	1.E-9	2.E+12	5.00E-07	0.000
Cadmium	0.005	1.E-9	5.E+12	2.00E-07	0.000
Chlordane	1	1.E-9	1.E+15	1.00E-09	0.000
Chromium	0.5	1.E-9	5.E+14	2.00E-09	0.000
Chrome (hex)	0.01	10	1,000.	1.00E+03	0.005
Cobalt	0.02	1.E-9	2.E+13	5.00E-08	0.000
Copper	1	1.E-9	1.E+15	1.00E-09	0.000
Cyanides	5	1.E-9	5.E+15	2.00E-10	0.000
Endosulfan	0.1	1.E-9	1.E+14	1.00E-08	0.000
Fluorides	2.5	1.E-9	2.5E+15	4.00E-10	0.000
Lead	0.05	1.E-9	5.E+13	2.00E-08	0.000
Manganese	1	1.E-9	1.E+15	1.00E-09	0.000
Mercury	0.05	1.E-9	5.E+13	2.00E-08	0.000
Nickel	1	1.E-9	1.E+15	1.00E-09	0.000
Oil Mist	5	1.E-9	5.E+15	2.00E-10	0.000
PCBs	0.2	1.E-9	2.E+14	5.00E-09	0.000
PNAs	0.2	1.E-9	2.E+14	5.00E-09	0.000
Phthalates	5	1.E-9	5.E+15	2.00E-10	0.000
RDX	1.5	1.E-9	1.5E+15	6.67E-10	0.000
Selenium	0.2	1.E-9	2.E+14	5.00E-09	0.000
Silica	0.05	1.E-9	5.E+13	2.00E-08	0.000
Silver	0.01	1.E-9	1.E+13	1.00E-07	0.000
Thallium	0.1	1.E-9	1.E+14	1.00E-08	0.000
Tin	2	1.E-9	2.E+15	5.00E-10	0.000
Titanium	10	1.E-9	1.E+16	1.00E-10	0.000
Trinitrobenzene	0.07	1.E-9	7.E+13	1.43E-08	0.000
Trinitrotoluene	0.5	1.E-9	5.E+14	2.00E-09	0.000
Vanadium	0.05	1.E-9	5.E+13	2.00E-08	0.000
Zinc	5	1.E-9	5.E+15	2.00E-10	0.000
			Sum	1.00E+03	
Dust Exposure Level at Mixture PEL =			1,000.000		0.005

EQUATIONS USED IN THIS CALCULATION

Dust action level = (For one dust)

$$\frac{(1E+6)(\text{Exposure Limit mg/m3})}{(\text{Concentration mg/kg})(\text{Safety Factor})}$$

Dust action level = (For mixed dusts)

$$\frac{(1E+6) / (\text{Safety Factor})}{\text{Sum of [(Concentration mg/kg) / (Exposure Limit)]}}$$

Spreadsheet: Dustlevl.xls

Author: Chris Marlowe
908 / 225 - 7000

Name of Site

Radionuclide	Airborne Limit (pCi/l)	Maximum Soil Concentration (pCi/g)	Action Level f. ngle Compound (mg/m3)	Quotient for ach Compound (level/limit)	Problem from Single Compound [5mg/m3)/ELmix]
Americium-241	0.003	0.00	3.0E+12	3.33E-07	0.000
Carbon --- 14	1000	0.00	1.0E+18	1.00E-12	0.000
Cesium -- 137	60	1,300,000.00	4.6E+01	2.17E+04	0.108
Cobalt --- 60	10	100.00	1.0E+05	1.00E+01	0.000
Iodine -- 131	20	0.00	2.0E+16	5.00E-11	0.000
Lead -- 210	0.1	0.00	1.0E+14	1.00E-08	0.000
Lead -- 212	10	0.00	1.0E+16	1.00E-10	0.000
Manganese--54	300	1.00	3.0E+08	3.33E-03	0.000
Molybdenum-99	1000	0.00	1.0E+18	1.00E-12	0.000
Phosphorus-32	200	0.00	2.0E+17	5.00E-12	0.000
Plutonium-238	0.003	1.00	3.0E+03	3.33E+02	0.002
Plutonium-239	0.003	600.00	5.0E+00	2.00E+05	1.000
Polonium--210	0.3	0.00	3.0E+14	3.33E-09	0.000
Potassium--40	200	11,000.00	1.8E+04	5.50E+01	0.000
Radium -- 226	0.3	15,000.00	2.0E+01	5.00E+04	0.250
Radium -- 228	0.5	0.00	5.0E+14	2.00E-09	0.000
Sodium --- 22	300	0.00	3.0E+17	3.33E-12	0.000
Strontium- 90	8	95,000.00	8.4E+01	1.19E+04	0.059
Technetium-99	300	0.00	3.0E+17	3.33E-12	0.000
Tellurium-132	90	0.00	9.0E+16	1.11E-11	0.000
Thorium - 230	0.003	0.00	3.0E+12	3.33E-07	0.000
Thorium - 232	0.003	0.00	3.0E+12	3.33E-07	0.000
Tritium - H3	20000	6.00	3.3E+09	3.00E-04	0.000
Uranium - 234	0.02	0.00	2.0E+13	5.00E-08	0.000
Uranium - 235	0.02	1.00	2.0E+04	5.00E+01	0.000
Uranium - 238	0.02	1.00	2.0E+04	5.00E+01	0.000
Yttrium -- 91	300	95,000.00	3.2E+03	3.17E+02	0.002
Zirconium- 95	50	0.00	5.0E+16	2.00E-11	0.000
			Sum	2.84E+05	
Level at PEL for Mixture =				3.51671019	

APPENDIX F

PERSONAL ACKOWLEDGEMENT

PERSONAL ACKNOWLEDGEMENT

A component of the Health and Safety Plan and Emergency Response Plan (Plan), designed to provide personnel safety during this subsurface investigation requires that you receive training as described in the HASP prior to working at the Site. Additionally, you are required to read and understand the HASP. When you have fulfilled these requirements, please sign and date this personal acknowledgement:

Printed Name	Signature	Date